SOUTHERN POWER AND INDUSTRY

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MAY, 1953

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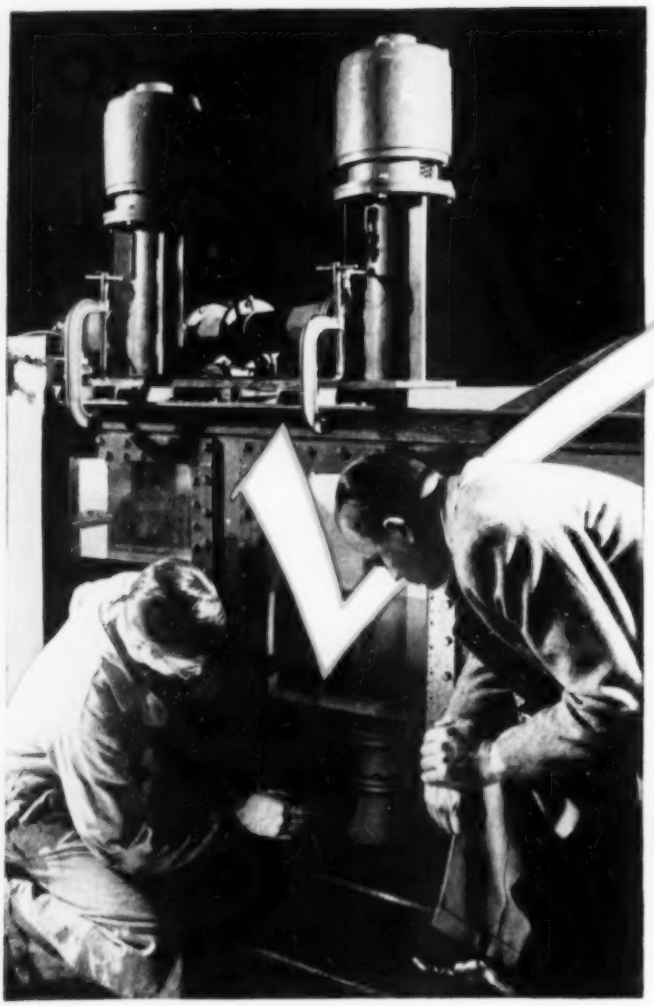
Seventh Annual Maintenance Issue



ALLIS-CHALMERS
PUMP
Laboratory

Check

Suction Bay and Pump Performance in Advance

Use this Allis-Chalmers pump laboratory to duplicate your suction bay design and operating conditions.

WHY CHANCE EXPENSIVE BUILDING ALTERATIONS when you can be sure of suction bay and circulating pump performance in advance. In the Allis-Chalmers pump laboratory, an exact scale model of your suction bay can be built. Then you observe the effects of different foundation arrangements . . . can check efficiencies under partial load . . . test the ultimate capacity of your design in case of expansion . . . see what happens under different water conditions. This way you can be sure that you have the right design, down to the last detail.

Available to Power Plant Operators and Consulting Engineers

The Allis-Chalmers pump laboratory is located at the West Allis, Wisconsin, Works and is available for use for all power plant operators and consulting engineers with large pump and water supply problems. For details of the services available, call your Allis-Chalmers District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3973

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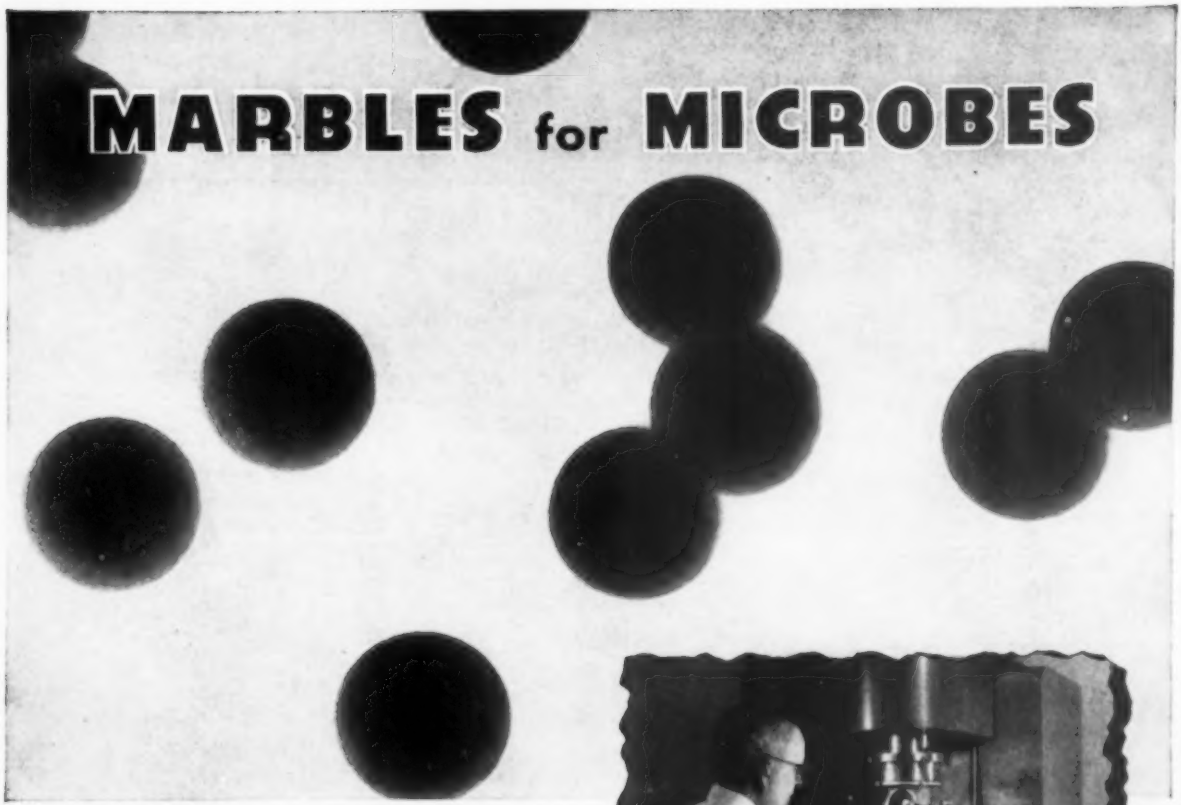
Volume 71 Number 5

MARBLES for MICROBES



Above—100,000X enlargement of latex spheres used to calibrate electron microscope in Nalco Laboratories. Actual diameter of spheres is 0.25 microns—.00000975 inches! *Right*—Inserting specimen holder in vacuum chamber of Nalco electron microscope.

. . . How they assist research toward better Water Treatment

PERHAPS even too small to make good marbles for microbes, these tiny spheres help Nalco Scientists in their investigations of the microscopic realms of matter only recently made visible to the human eye by the electron microscope.

Use of the electron microscope in water treatment research is significant because it typifies the continuing efforts of the entire Nalco organization to keep the Nalco System representative of the first and best in all phases of modern industrial water treatment.

If you are not already participating in the economy and efficiency of the Nalco System in your plant, write for details on real water treatment security today.

NATIONAL ALUMINATE CORPORATION
6226 West 66th Place • Chicago 38, Illinois

In Canada: Alchem Limited, Burlington, Ontario

THE *Nalco*®
SYSTEM . . . Serving Industry through Practical Applied Science

Nalco WATER TECHS

New reprint of A.S.M.E. Paper No. 52-A-30: *Experimental Studies of Boiler Tube Metal Temperatures: Effect of Heat Transfer Rate and Deposit Thickness*, gives technical data on high-heat-transfer-rate effects (140,000 to 300,000 Btu/sq. ft./hr.) at pressures from 250 to 2500 p.s.i. 16 pages, with tables and diagrams. Author: C. Jacklin, Director, Engineering Research, National Aluminate Corporation.

Your Copy Free Upon Request

here's why

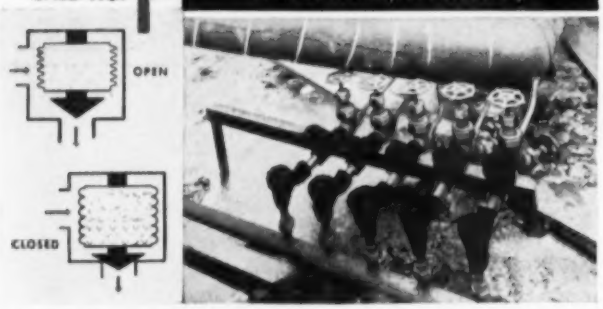
they selected 4 different types of steam traps for 4 different applications

CONDITIONS under which steam traps must operate vary widely, but there is for every service one type that gives maximum efficiency.

Sarco makes the 4 distinctly different TYPES of steam traps shown below. Therefore, Sarco can give you *impartial* advice on the best choice for your particular installation.

For each of the 4 jobs listed below, the users selected four different TYPES of Sarco traps.

CASE NO. 1 — Draining outside tracer lines in an oil refinery in New Jersey



Type of traps installed: Sarco No. 9 thermostatic traps.

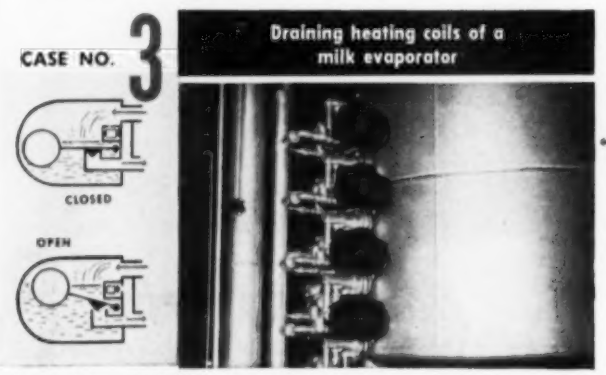
Why selected: Being thermostatic, they are steam misers. Can't freeze, being wide open when cold. Easy to maintain since only the bellows moves. Small, light and easy to install. Self-adjusting for different pressures.

CASE NO. 2 — Draining platens of compression plastic presses

Type of traps installed: 100 Sarco Inverted Bucket traps in service for 17 years.

Why selected: Press platens have small horizontal steam spaces; the intermittent blast discharge of these Sarco traps scours the heating surface. Built-in strainer cuts maintenance costs.

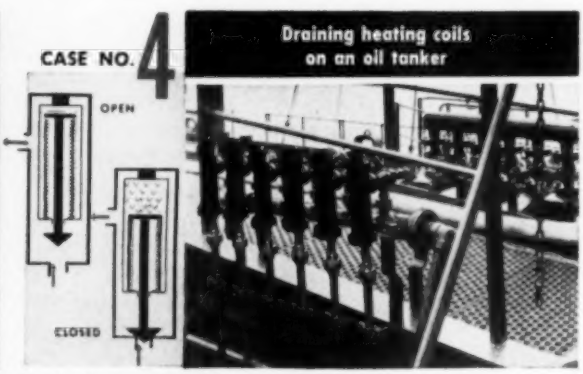
CASE NO. 3 — Draining heating coils of a milk evaporator



Type of trap installed: Sarco Float-Thermostatic Trap.

Why selected: Heating surfaces of the coils must be kept full of live steam—this Sarco trap discharges condensate as it collects. Can't airbind because the integral thermostatic vent gets rid of air, regardless of operating steam pressure and temperature. As shown in sketch 3 above, this vent does *not* depend upon the discharge of condensate.

CASE NO. 4 — Draining heating coils on an oil tanker



Type of traps installed: Sarco LIQUID EXPANSION traps No. 871.

Why selected: Traps on tankers are exposed to freezing weather and vibration. Sarco's No. 871 traps can't freeze; resist vibration, water-hammer, pressure pulsations and superheat. These traps discharge condensate at adjustable temperatures below 212°F., permitting use of some of the condensate's sensible heat.

Write today for Bulletin No. 145-A: *Selecting the Right TYPE Steam Trap.* Sarco Company, Inc., Empire State Bldg., New York 1, N. Y. Represented in principal cities. Sarco Canada Ltd., Toronto 8, Ontario.

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SARCO saves steam

improves product quality and output

SOUTHERN POWER AND INDUSTRY

MAY 1953

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

May, 1953

► THE SOUTHERN INDUSTRIAL DIRECTORY -- 2nd Annual Edition -- has been completed. This index is one of the most comprehensive surveys yet made of the mushrooming industries of the South and Southwest.

Last year's directory showed that the South was adding an average of one new multi-million dollar manufacturing plant per day. The new survey indicates that this rate of progress is continuing and that the variety of Southern manufacturing is increasing proportionately. The 2nd Annual Edition lists more than 12,500 Southern manufacturing plants employing 50 or more workers.

The directory features an alphabetical index of firms, a geographical index of major manufacturing plants showing areas in which industry is concentrated, and an expanded research and reference section. Copies are available at $5 each from the Southern Association of Science and Industry, 5009 Peachtree Rd., Atlanta, Georgia.

► NEW CUTTING AND PIERCING process for stone, concrete and refractory materials employs an arc-torch -- DynaTrode. The self energizing arc rod creates its own arc and can be used upon non-conductive material WITHOUT A GROUND CONNECTION.

Only equipment necessary includes any conventional d-c arc welding machine capable of generating 200 amps or more, a DynaTrode holder (which can be also used with conventional welding electrodes) and the DynaTrode rod. Compressed air, water cooling systems, auxiliary power, etc., are eliminated.

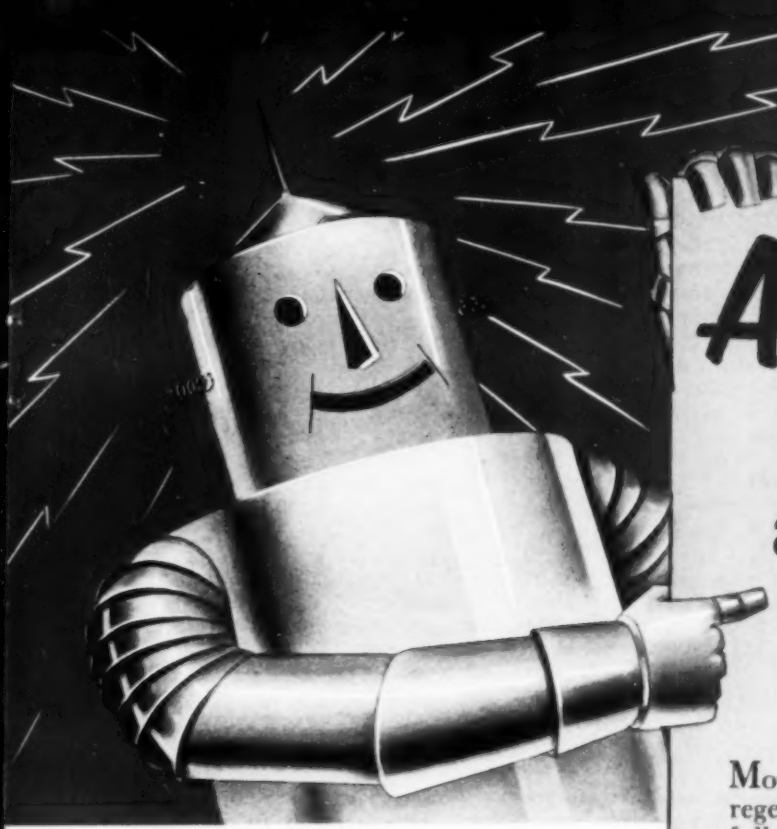
Penetration is 1 to 3 in. per minute according to the material upon which rod is used. Developer of the process -- ChemoTec Div., Eutectic Welding Alloys Corporation -- emphasizes that the arc, which will operate in mid-air as well as upon stone, has the characteristics of a super torch flame from 5 to 8 in. in length. Applications include drilling holes in concrete; smokestack demolition; cutting flues, sewer pipe; or cutting holes for plumbing and electrical conduits.

► PLASTIC PIPE is superior to other types of pipe in some respects. It is economical, offers little resistance to liquid flow, has low electrical conductivity, is light in weight, has fair resistance to impact and good resistance to chemicals.

Thermoplastic type pipe is satisfactory at temperatures up to 150 F, and when armored with steel or thermosetting plastics is good up to 190 F. Thermosetting plastic pipe can be used to transport boiling solutions.

In spite of some 20 years successful experience in Europe, plastic pipe is relatively new in this country. But the amount used will double every two years during the next decade. Sufficient basic information to permit plant engineers and maintenance men to select and use plastic pipe correctly is scheduled for early publication in SP&I.

(Continued on page 6)



AUTOMATIC

Demineralization and Silica Removal by Ion Exchange Resins

MOTOR and diaphragm-operated valves make regeneration of Permutit Demineralizers fully automatic. This gives more positive control . . . eliminates the possibilities of costly errors . . . saves valuable man-hours formerly spent in regeneration.

In a recent installation for a 1450 psi boiler, two compact Permutit units fill all make-up requirements, regardless of changes in turbine loads . . . deliver a continuous supply of demineralized, silica-free water. What better way to eliminate scale and silica deposits!

HIGHEST PURITY MAKE-UP

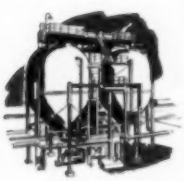
Effluents of Permutit Demineralizers have contained *total* electrolytes as low as 0.01 ppm and silica as low as 0.01 ppm! These values may be slightly higher under service conditions. In comparison, most distilled water contains 20 to 100 times more electrolytes . . . yet costs much more to produce.

INFORMATIVE NEW BULLETIN

You'll want this interesting book. Flow diagrams, illustrations and specifications explain key methods of demineralizing water and removing silica by ion exchange. Write for your copy, today!

THE PERMUTIT COMPANY, Dept. SI-5, 330 West 42nd Street, New York 36, N. Y., or the Permutit Company of Canada, Ltd., 6975 Jeanne Mance Street, Montreal, P. Q.

OTHER BASIC WATER CONDITIONING PROCESSES



Sludge Blanket Hot Lime Soda

Full utilization of Permutit sludge-blanket principle assures high efficiency. Reduces hardness to region of 20 ppm . . . silica to 2.0 ppm. Lowers alkalinity . . . removes wide variety of solids.

Hot Zeolite—Permutit Q

Permutit Q—a styrene base resin resistant to high temperatures and pH values—replaces second stage phosphate treatment in hot-process softener. Results—residual hardness is completely removed at great savings in phosphate costs.

Deaerating Heater

Removes objectionable oxygen and CO_2 to prevent corrosion and pitting of feed lines, stage heaters, economizers, and boilers at high temperatures. Steam is used twice . . . deaerates water completely.

Precipitator

Softens water on space and time-saving sludge-blanket principle. Simultaneously removes turbidity, color, fluorides, reduces silica and lowers alkalinity.

PERMUTIT

ION EXCHANGE AND WATER CONDITIONING HEADQUARTERS FOR OVER 40 YEARS

facts and trends *(continued from page 4)*

► CATALYTIC FORK-TRUCK MUFFLERS that remove noxious carbon monoxide and hydrocarbon fumes issuing from gasoline engines will be in operation at the Materials Handling Show in Philadelphia, Pa., May 18-22nd. The OCM Catalytic Exhaust System, product of Oxy-Catalyst, Inc., permits drivers to operate fork-lift trucks with complete safety in confined plant areas.

Basic unit of the fork truck muffler is the Oxycat, a device which has proved successful in combating air pollution and recovering waste heat energy in industrial plant installations. In its first application (a metal finishing plant) it literally permitted the plant to run on its own smells. The Oxycat oxidized noxious solvent fumes into heat energy that could be used to run the plant's coating lines. In a refinery it converted waste cat cracker gas into steam energy and power to run a gas compressor.

The OCM exhaust system is a cartridge of spaced porcelain rods coated with a catalytic agent -- catalytic alumina and platinum alloy. Engine exhaust flows across the surface of these rods where combustion of carbon monoxide and other harmful vapors takes place. On leaving the catalyst, the exhaust contains mostly carbon dioxide and water vapor, and only slight traces of the original contaminants.

► HIGHER STEAM PRESSURES demand make-up water of minimum and preferably no mineral solids. In the past such a quality of water could be obtained only by evaporation. Demineralization by ion exchange is now available to produce the equivalent of distilled water.

It acccmplishes the same result as evaporation but differs greatly in the methcd of accomplishment. The evaporator removes the water as vapor frcm the mineral solids which concentrate in the evaporator, whereas demineralization removes the solids by ion exchange.

Two types of power plants are especially interested in demineralization. First, the steam power plant designed exclusively for the manufacture of electrical power. This is a surface condensing plant and requires only a small percentage of make-up. Second, the plant which produces by-product power with high pressure turbines which supply exhaust steam for process.

Approved demineralization techniques, featuring typical installations in the South and Southwest are discussed in this 7th Annual Plant Maintenance Issue of SP&I.

► TRANSMITTING ORDERS from a sales office in one city to a factory in another location? Krafco Container Corporation, a leading Southern manufacturer of corrugated fibre shipping containers, was endeavoring to provide customers with as rapid and accurate service as possible. Krafco's executive and sales offices are in Dallas, Texas, and the manufacturing plant in Monroe, Louisiana.

A teletype system was evolved which simultaneously prepares customer acknowledgments, sales file records, and invoices in the Dallas office and factory orders and shipping tallies in the Monroe factory office. Either private line or the regular teletypewriter exchange can be employed with this system. Krafco has successfully printed eight ccpies cf assorted forms cn one teletype machine.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.

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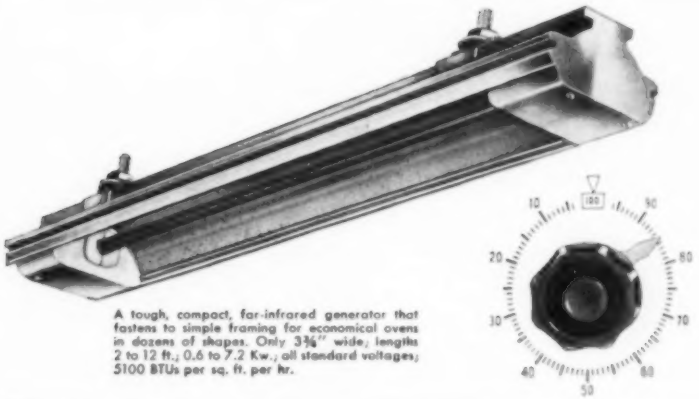
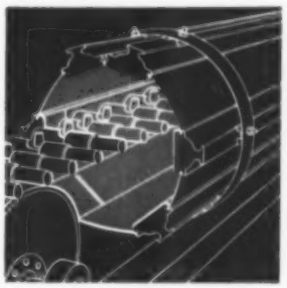
uniform heat . . .
precise heat . . .
fast heat . . .
"color blind" heat . . .

TWO JOB-PROVED FAR-INFRARED TYPES TO CHOOSE FROM!

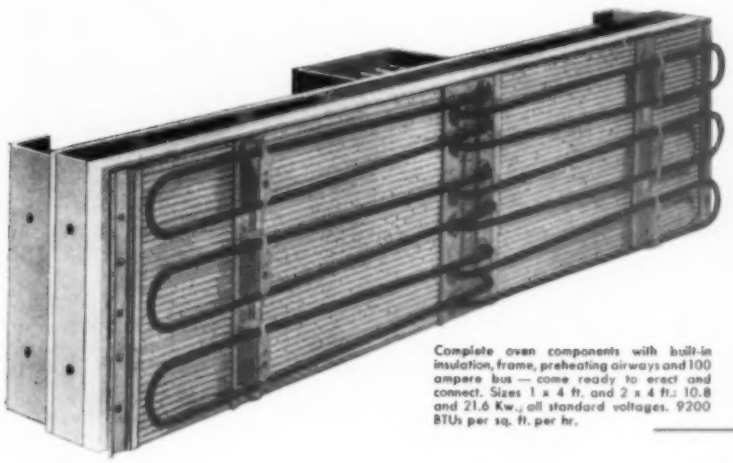
You'll find Chromalox pre-built Radiant Panels and Heaters from stock fit your jobs and your budget. Shown below are just two of the literally hundreds of oven shapes and sizes which can be erected quickly and easily using Chromalox Electric Radiant Units.



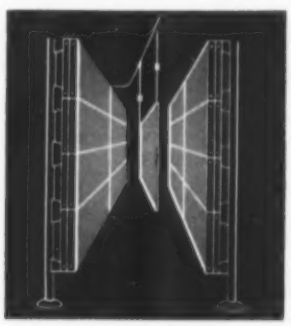
A tough, compact, far-infrared generator that fastens to simple framing for economical ovens in dozens of shapes. Only 3¾" wide; lengths 2 to 12 ft.; 0.6 to 7.2 Kw., all standard voltages; 5100 BTUs per sq. ft. per hr.



Conveyorized oven built on the job using Chromalox Radiant Heaters. Units are installed in lengths and ratings needed to fit the work. Input controller gives precise and exact temperatures easily adjusted to meet varied processing requirements. Easy to assemble, easy to wire.



Complete oven components with built-in insulation, frame, preheating airways and 100 ampere bus — come ready to erect and connect. Sizes 1 x 4 ft. and 2 x 4 ft.; 10.8 and 21.6 Kw., all standard voltages. 9200 BTUs per sq. ft. per hr.



Chromalox pre-engineered Radiant Panels are easily and quickly erected and connected to form ovens and drying tunnels of any size and shape. An oven such as sketched may be installed in 20 to 30 man-hours with minimum engineering expense and lowest cost per installed kilowatt.

A Chromalox Electric Radiant Panel or Chromalox Radiant Heater installation gives you a quick, low-cost answer to your baking, curing, drying and other heating needs. Pre-engineered units allow on-the-spot erection and connection. You get up to 700° F. work temperatures; absolutely uniform radiation with no hot and cold spots; high intensity heat that's absorbed *f-a-s-t* by all colors; and accurate "dialed" heat from 0 to 100% of capacity.

CHROMALOX *Electric*

Far-infrared Units

Have a Problem Involving Degreasing, Drying, Baking, Preheating, Curing?

The assistance of Chromalox Application Engineers is yours for the asking. They'll help you work out your specific requirements without obligation. Write today.

EDWIN L. WIEGAND CO. IC-70
7563 Thomas Blvd., Pittsburgh 8, Pa.

I'm interested in electric heat for.....
.....
.....

☐ Send me Bulletins on Far-infrared units.
☐ Have a Chromalox Application Engineer get in touch with me.

Name.....
Company.....
Street.....
City.....Zone.....
State.....

C. B. Rogers and Associates, 1000 Peachtree St., N. E., **Atlanta 5, Ga.**; L. R. Ward Co., 2711 Commerce St., **Dallas 1, Texas**; 1814 Texas Avenue, **Houston 3, Texas**; 1519 South Boston Ave., **Tulsa 14, Okla.**; Ranson, Wallace & Co., 1161½ East Fourth Street, **Charlotte 2, N. C.**

Equipment . . Supplies . . Methods

for the plant engineer and maintenance man

Free additional information is available to readers of SP&I. Circle the item code number on one of the reader service post cards provided on pages 17-18.

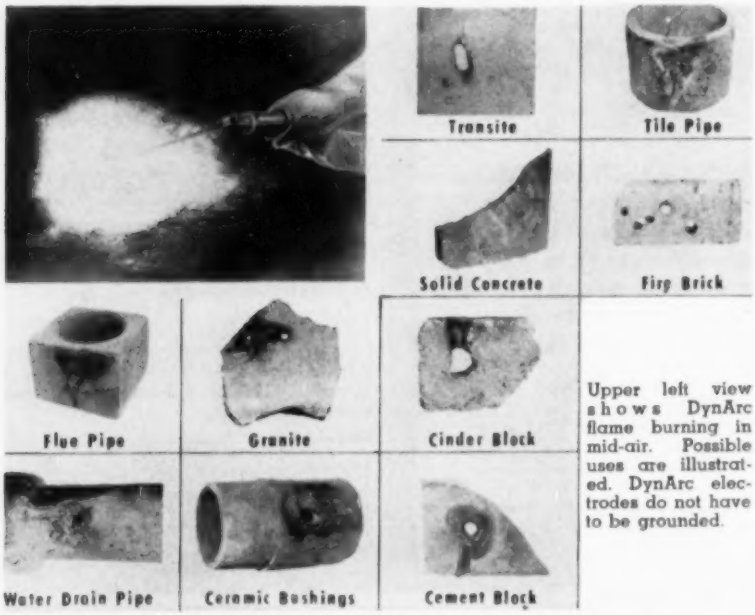
Arc Rod Pierces Refractory Materials — 1 to 3 in/min

E-1 EUTECTIC WELDING ALLOYS CORPORATION, ChemoTec Division, Flushing 58, New York, have announced the DynArc process for cutting and piercing stone, cement, concrete and refractory materials. The arc rod can be used upon non-conductive material without a ground connection.

The process may be used wherever a d-c welding machine of 200 amp or more capacity is available. No compressors, air lines, oxygen tanks, pneumatic drills, etc., are necessary. Operator has complete control at all times and determines when and where the arc will start. Arc, which will operate in mid-air as well as upon stone, has the characteristics of a super torch flame from 5 to 8 in. in length.

Equipment necessary includes only DynaTrodes, a DynaTrode holder (which can be used with conventional welding electrodes), and a conventional welding machine. The length of the arc is not determined by the distance the arc rod is held from the material. The arc remains constant irrespective of distance.

Applications include drilling holes in reinforced concrete for machine installations, cutting chimney flues, cutting wire fence, sewer pipe, or removing slag from furnace floors.

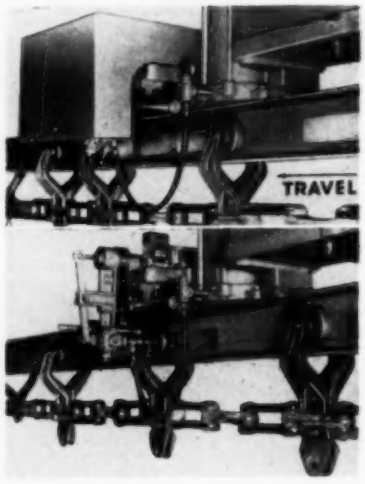


Upper left view shows DynArc flame burning in mid-air. Possible uses are illustrated. DynArc electrodes do not have to be grounded.

Trolley Wheel Lubricator

E-2 STEWART-WARNER CORPORATION, Alemite Division, 1826 Diversey Parkway, Chicago 14, Ill., has announced a new automatic device for lubrication of conveyor trolley wheels.

The new Alemite lubricator delivers a pre-set, constant shot of either oil or lubricant to each trolley wheel on each side of the conveyor system into which it is installed, simply by the flick of a switch.



Top view shows wheel approaching grease applicator. Spring plate helps align wheel. Protective cover has been removed in the lower view. Coupler engages grease fitting on wheel for high pressure lubrication.

The entire unit is contained on a section of I-beam 37¾ or 40 in. in length which is fitted into the conveyor track at any convenient spot in its length, so long as the location is within reach of the house air line and a 115-volt, 60-cycle electrical outlet. Head-room of 22 in. over the top of the I-beam is required.

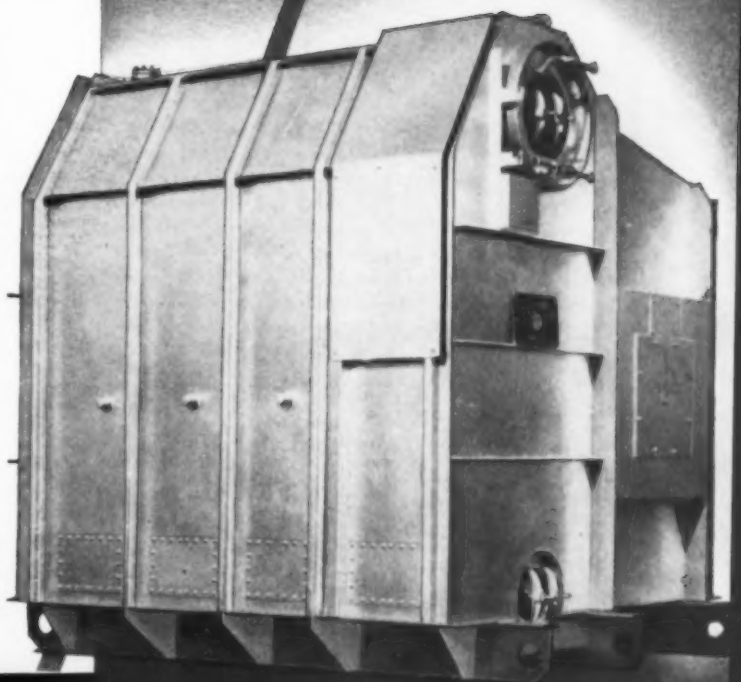
As each wheel reaches the spot on the track at which the lubricator is installed, a coupler clamps the lubricant fitting on its hub and delivers the required amount of lubricant. The coupler instantly disengages and is ready for the next wheel.

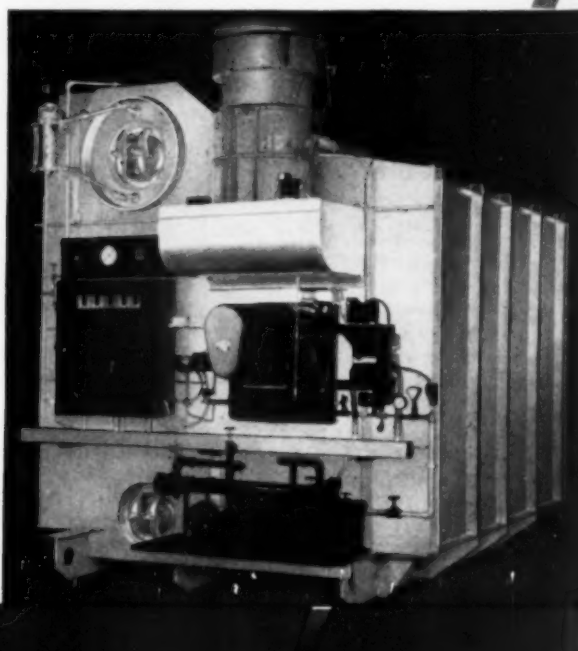
(*Continued on page* 10)

"PACKAGED POWER!"

SPRINGFIELD
PACKAGE TYPE BOILERS

HERE is Springfield's new Package Type Boiler designed especially to meet many of today's requirements for steam and high temperature hot water in industry, power, and government projects. This new line has had the benefit of more than five years of field testing and development work. Boilers are now available in a range of sizes from 7,500 to 30,000 lbs. of steam per hour, or equivalent water ratings in B.T.U., and in design pressures of 200, 300, 600, and 900 psig. These units combine all the advantages of compact, standardized, portable package boilers with the high efficiency and rugged reliability of Springfield's water tube design. ***Let us give you complete information now.***





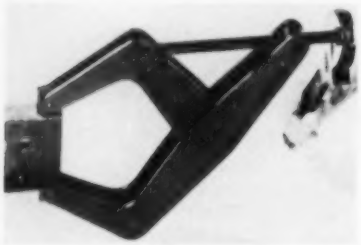
FOUNDED SPRINGFIELD BOILERS IN 1890

Built to Springfield Standard of Quality

Equipment . . Supplies . . Methods (continued)

Clamp Design

E-3 CENTINELA INDUSTRIAL SUPPLY COMPANY, 11930 Inglewood Ave., Hawthorne, Calif., has developed a new Saxton "Kant-Twist" clamp, with a capacity range from 3 in. to 12 in.



The clamp has been perfected from new metal alloys, which makes it possible to produce the same gripping or clamping strength as clamps of comparable size and strength, yet it is 65 per cent lighter in weight.

Pipe Insulation

E-5 OWENS-CORNING FIBERGLAS CORPORATION, Toledo 1, Ohio, is manufacturing a new wrap-around fiberglas pipe insulation, adaptable to hot and cold pipes of all sizes.

Known as Aerowrap, the new product is flexible and easy to apply on flanges, fittings and valves, as well as to hot and cold pipes of all sizes.

It is a fine fibered insulating blanket with a special binder for use in industrial applications. It is soft and resilient and has a high heat-saving thermal efficiency.

Aerowrap is available in 100 ft rolls, 36 in. wide and three-fourths of an inch thick. Pieces from the same roll may be used on different sizes of pipe for any thickness of insulation required and also on fittings. The insulation may be cut easily with shears, knife or paper cutter.

It may be used on pipes with temperatures ranging from sub-zero to 600 F and may be applied in various degrees of thickness without difficulty by repeated wrapping.

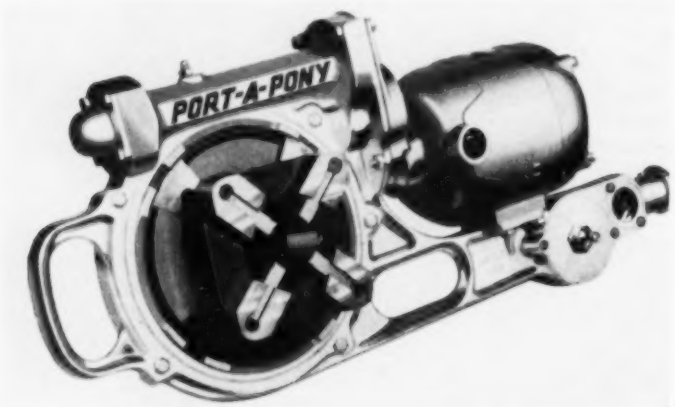
Acetylene Torch

E-6 THE VELOCITY POWER TOOL COMPANY, 7507 Thomas Blvd., Pittsburgh 8, Pa., has announced an automatic acetylene-air gas torch, designed for savings in time, money, and gas, as well as greater fire safety.

The pistol-shaped "Torch-O-Matic" lights at squeeze of trigger and shuts off upon release, eliminating separate operation and equipment for relighting, manual valve adjustment, pumping or priming, and warm-up. It is said to be an especially versatile and handy tool in maintenance work of intermittent nature and general repair chores.

Squeezing the spring-loaded trigger simultaneously opens the torch gas valve and sparks the heavy-duty flint for ignition. Trigger also can be locked open for continuous flame.

(*Continued on page* 142)



Portable Power Pipe Threader

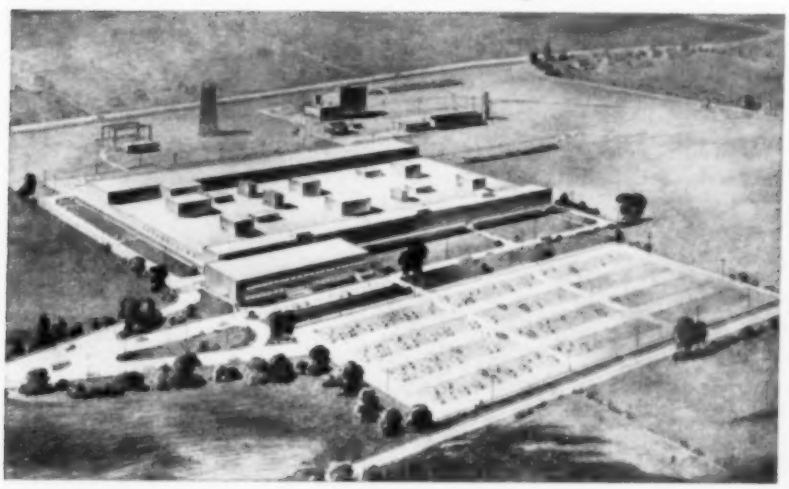
E-4 THE THREAD-EZY MFG. CO., Corunna, Mich., have developed the Port-A-Pony, a feather weight portable power pipe threader for threading pipe in the shop or in the field.

The Port-A-Pony utilizes the ring gear principle to turn dies at the most efficient cutting speed required to thread ¼ to 4 in. pipe. All popular types of hand die stocks are adaptable to the Port-A-Pony and dies can be seated and locked in place in a matter of seconds.

With a total carrying weight of only 26 lb, the Port-A-Pony is easily operated or transported by one man. Attached to the pipe in the same manner as a hand operated pipe threader, it turns ordinary die stocks at the proper cutting speed for top efficiency. Proper speed of operation is assured by the ½ hp, 110 volts a-c or d-c reversible electric motor which also removes the unit from finished threads with a flip of the toggle switch.

The unit cuts clean, leak-proof threads wherever the working area is 12 in. It does not require an experienced operator or special training. Because of its ability to operate in small places and in the field, it can be used in narrow tunnels, pits, ditches, overhead areas and within 5 in. of walls. Its many features also permit threading of stationary pipe in place for increased economy of operation.

TWO WICKES STEAM GENERATORS will help heat the CATERPILLAR TRACTOR CO.'s new plant at York, Pa.



CONTRACTORS: Consolidated Engineering Company Inc., Baltimore, Md.
CONSULTING ENGINEERS: Whitman, Requardt & Associates, Baltimore, Md.

The Caterpillar Tractor Co., one of the world's largest manufacturers of earth moving equipment, will shortly open their new York, Pa. plant where several hundred men will turn out track assemblies for world famous Caterpillar D6, D7 and D8 Tractors. In this modern manufacturing facility, Caterpillar has installed two 80,000 lb. WICKES steam generators to obtain efficient, economical heat throughout the 360,000 sq. ft. structure. These Type R 2-drum WICKES boilers have a design pressure of 200 psi. and are equipped with economizers and spreader stokers. WICKES can fill your requirements for steam generators up to 250,000 lbs. per hour and 1000 psi. – all types of multiple drum boilers, adaptable to any standard method of firing: oil, gas, underfeed or spreader stoker. Consult your nearest WICKES representative or write us today for descriptive literature.

145

WICKES

THE WICKES BOILER CO., SAGINAW, MICHIGAN • DIVISION OF THE WICKES CORPORATION

RECOGNIZED QUALITY SINCE 1854 • SALES OFFICES: Atlanta • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Denver • Greensboro, N.C. Houston • Indianapolis • Los Angeles • Memphis • Milwaukee • New York City • Pittsburgh • Portland, Ore. • Saginaw • Springfield, Ill. • Tampa Tulsa • Washington, D. C.

Revolutionary Performance!

Riley Boiler Unit gives bonus of 20,000 pounds per hour of steam to Masonite Corporation

Here's the maximum capacity guaranteed to Masonite by Riley Stoker Corporation:

50,000 lb. continuous
60,000 lb. for 15 min. peaks

And here's the Masonite report on performance: "For the past 75 days the average hourly load on the new boiler has been 70,000 pounds with peaks of one and more hours' duration of 75,000 pounds."

This same installation called for a guaranteed air heater gas temperature not in excess of 395 degrees at 50,000 pounds of steam per hour. In actual operation at 54,500 pounds of steam per hour, the air heater exit gas temperature was only 377.5 degrees!

No wonder Riley Stoker Corporation, Worcester, Massachusetts, is so well known among leading plants throughout the nation for the highly efficient performance of its boilers!

Coppus-Dennis FANMIX Burners Were Installed

To assure such revolutionary performance, Riley specified Coppus-Dennis FANMIX Burners for its boilers. The exclusive FANMIX action — on *all* Coppus burners, gas as well as combination gas-oil — is the reason for such performances.

FANMIX : Better Combustion : Better Efficiency : Higher Ratings

FANMIX burners, with their *revolving orifices*, give violent mechanical mixing and agitation of gas and air and, therefore, instantaneous and complete combustion with *minimum excess air* (5% excess air not unusual).

Furnace space is not required for mixing; therefore, *higher boiler ratings* are easily obtained.

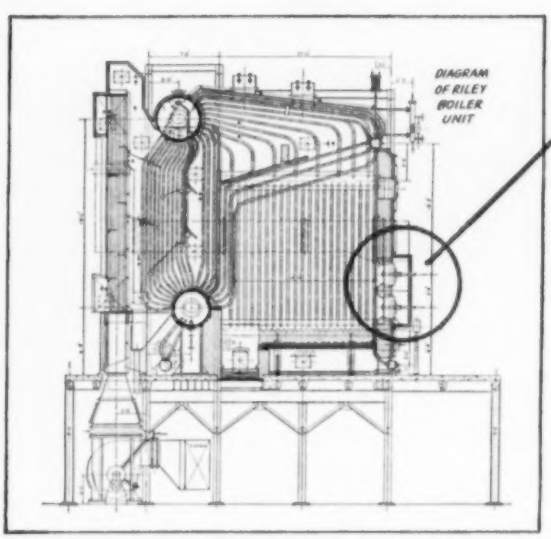
FANMIX burners, with shorter flame than any other burner, cannot cause flame impingement.

FANMIX burners, incorporating a *fan* as an integral unit, have *no draft loss* across the burner. Therefore, regardless of draft conditions, increased ratings are possible.

FANMIX action, with its quick completion of combustion, gives *lower* exit gas temperatures.

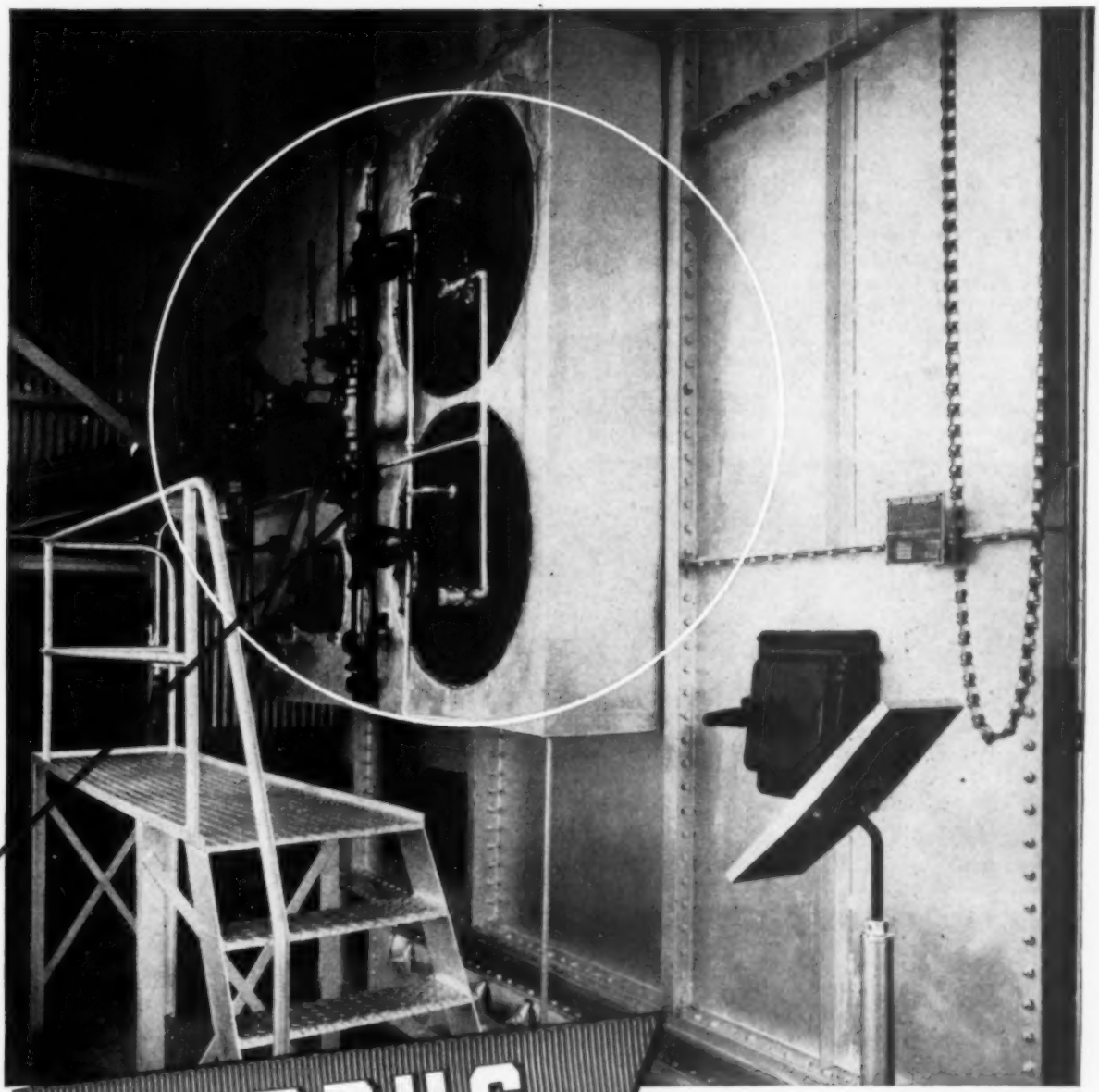
Plan now to take advantage of Coppus-Dennis FANMIX action with your present boiler. Remember — no forced draft equipment nor increase in stack nor increase in furnace volume is required for *FANMIX* operation to get increased capacity. And on *new* boilers, FANMIX lets you plan on reduced combustion space, higher ratings, less stack height or reduced induced draft capacity, and *no* forced draft equipment. Mail coupon today. Sales offices in *Thomas' Register*. Other "Blue Ribbon" Products in *Chemical Engineering Catalog, Refinery Catalog, Best's Safety Directory, and Mining Catalogs.*

JET REACTION is utilized to rotate fan which is integral part of burner. Automatically proportioned high velocity air passes at right angles through fuel to create ideal mixture for fast, complete combustion and peak efficiency.



Well-Known Users of Riley Units with FANMIX Burners Include:

Publicker Commercial Alcohol Co.
Monsanto Chemical Co.
Gaylord Container Corp.
Commercial Solvents Corp.
Celanese Corp. of America
Gulf Power Co.
Mississippi Power Co.
Eagle-Picher Lead Co.
Humble Oil & Refining Co.
Godchaux Sugars, Inc.
Kennecott Copper Corp.
Nicholson File Co.
Bird & Son, Inc.
— and many others



COPPUS

FANMIX BURNER

GAS - - - COMBINATION GAS-OIL

RILEY BOILER UNIT, using FANMIX burners, is here shown as installed for the Masonite Corporation, Laurel, Mississippi. Circle in diagram at left indicates position of burners pictured above.

SEND COUPON for further information. Coppus engineers FANMIX burners to your individual requirements.

PLEASE ATTACH THIS COUPON TO YOUR COMPANY LETTERHEAD

COPPUS ENGINEERING CORPORATION
245 Park Avenue
Worcester 2, Massachusetts

Please send complete data on Coppus-Dennis FANMIX Burners. I'm particularly interested in
☐ gas ☐ combination gas-oil.

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State .....

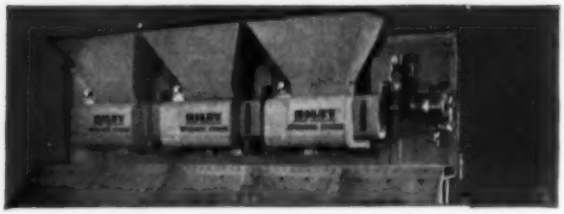
What has caused this tremendous SWING to Riley Traveling Grate Spreader Stokers?

As more and more Riley Traveling Grate Spreader Stokers have been placed in operation Riley Spreader Stokers are being selected by greater and greater numbers of the country's leading public utility and industrial plants—to such an extent that Riley sales in 1952 were more than four times 1950 sales and fifty per cent greater than in 1951 though total boiler and stoker industry sales were appreciably lower.

We believe the fundamental reason for this tremendous swing to Riley is that news of the excellent results and satisfactory performance of Riley Spreader Stokers has traveled rapidly from plant to plant. Such satisfactory performance is largely due to design characteristics and the vast experience of Riley in the stoker field.

MINNKOTA POWER COOPERATIVE, INC
Grand Forks, North Dakota
Two Riley Traveling Grate Spreader Stokers

THE GRATE SURFACE The grate surface is made up of small clips, two inches wide by six inch pitch, mounted on structural T bars. The use of small grate clips eliminates warping and cracking and assures low maintenance and long life by providing adequate cooling. Clips are of nickel-chrome alloy to minimize growth. A level grate surface and uniform air distribution results.



THE FEEDER-DISTRIBUTOR The feeder is designed to give uniform positive feed regardless of coal characteristics and moisture. Avalanching with fine coal does not occur. The overthrowing distributor gives uniform longitudinal and lateral distribution and prevents damage and outage caused by wedging of foreign materials between distributor and housing.

TRADE MARK Rx REGISTERED

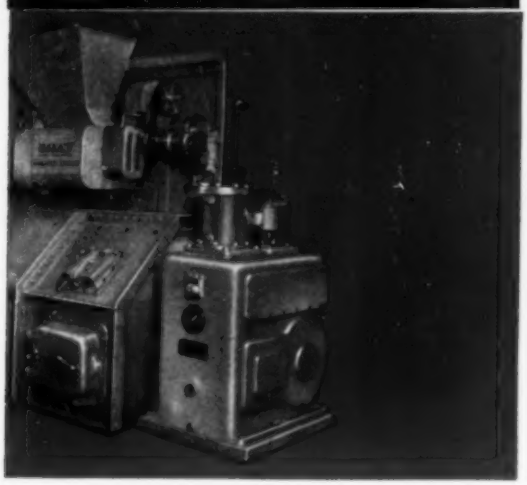
RILEY

STOKER CORPORATION, WORCESTER, MASS.

Boston New York Philadelphia Washington Buffalo Pittsburgh Cleveland Detroit Chicago
Cincinnati Charlotte Atlanta New Orleans St. Louis Kansas City St. Paul Tulsa Houston
Denver Salt Lake City Los Angeles Portland Seattle

BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • ECONOMIZERS

Comparative Sales of Riley Traveling Grate Spreader Stoker for 1950 - 1951 - 1952



THE GRATE DRIVE The Riley grate drive is a hydraulically driven ratchet drive, completely enclosed and automatically lubricated. This simple rugged drive operates with practically no maintenance and is not susceptible to damage in case of grate obstruction. No sprockets, chains or speed reducers are required.

BACKED BY OVER 50 YEARS OF EXPERIENCE There are over 50 years of stoker designing and manufacturing experience back of the Riley Traveling Grate Spreader Stoker, dating back to the two first successful makes of stoker—the Murphy Furnace and the Jones Underfeed Stoker. Riley has been manufacturing traveling grate stokers for over 30 years.

We believe it will pay you to visit some installations before purchasing traveling grate spreader stokers.

All of these Companies have ordered Riley Traveling Grate Spreader Stokers

Montana-Dakota Utilities
Mandan, North Dakota

Upper Peninsular Power Co.
Houghton, Michigan

Bendix Aviation Corp.
South Bend, Indiana

Hawaiian Commercial & Sugar Co.
Maui, Hawaii

General Motors Corp.
Saginaw Steering Gear Div.
Saginaw, Michigan

White Pine Copper Co.
White Pine, Michigan

Electrica De Bogota
Bogota, Colombia

Ohio Edison Co.
Youngstown, Ohio

City of Painesville
Painesville, Ohio

Carbide & Carbon Chemical Company
Whiting, Indiana

Ohio Edison Company
Springfield, Ohio—two orders

Iowa-Illinois Gas & Electric Company
Iowa City, Iowa

Celanese Corp. of America
Hopewell, Virginia

Cliffs Power & Light Company
Ishpeming, Michigan

Iowa Public Service Company
Carroll, Iowa

Kennecott Copper Company
McGill, Nevada

General Electric Company
Richland, Washington

Garlock Packing Company
Palmyra, New York

Swift & Company
Baltimore, Maryland

E. I. DuPont de Nemours & Co.
Savannah River Project, South Carolina

Kaiser-Frazer Company
Willow Run, Michigan

B. F. Goodrich Company
Akron, Ohio

Utah-Idaho Sugar Company
Washington

Armstrong Cork Company
Lancaster, Pennsylvania

Pennsylvania Electric Company
Seward, Pennsylvania—three orders

Ohio Edison Company
Youngstown, Ohio

Ottertail Power Company
Crookston, Minnesota

Champion Paper & Fibre Company
Canton, North Carolina

Central Illinois Light Company
Springfield, Illinois

Monsanto Chemical Company
Springfield, Massachusetts

General Electric Company
Louisville, Kentucky

Gaylord Container Company
Bogaluza, Louisiana

John Deere & Company
Alladin, Iowa

Swift & Company
Charlotte, North Carolina

Brown-Lipe-Chapin Div.
General Motors Company
Elyria, Ohio

U. S. Gypsum Company
Oakfield, New York

Stokely Foods
Indianapolis, Indiana

Catalytic Construction Company
Fernald Project, Ohio

Sangamo Electric Company
Springfield, Ohio

University of Minnesota
Minneapolis, Minnesota

Rochester Municipal Plant
Rochester, Minnesota

City of Napoleon
Napoleon, Ohio

Corn Belt Power Co-op.
Humboldt, Iowa

U. S. Air Force Base
Limestone, Maine

City of Ames
Ames, Iowa

Alabama Electric Co-op.
Andalusa, Alabama

Minnkota Power Cooperative, Inc.
Grand Forks, North Dakota

Spokane Water Works
Spokane, Washington

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs

COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • AIR HEATERS

WHERE TO GET IT *And How to Do It*

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Check the list, fill in Coupon, mail to SOUTHERN POWER & INDUSTRY. (Coupon Post Cards on pages 17 and 18.) This service restricted to those interested in the operation or design of Industrial, Power and Service Plants.

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7 **WATER TUBE BOILERS**—Bulletin, 12 pages—Illustrates and describes special and standard power plant boilers and packaged steam generators. Complete engineering data, dimensions, illustrations, etc.—SPRINGFIELD BOILER CO.

11 **CONTROLLED FLOW GAS DAMPERS**—Catalog 10—Describes the reliable operation, increased capacity, reduced maintenance, greater flexibility, higher efficiency and other advantages gained by the Heacon damper in controlled flow of gases. —THERMIX ENGINEERING CO.

16 **AUTOMATIC BULK SCALE**—Bulletin 1449—Describes an automatic bulk weighing scale accommodating belt, screw or vibrating feeder, with discharge counter, totally enclosed. Capacity 200 to 1000 lb. Multiple scale installations coordinated by control panel.—RICHARDSON SCALE CO.

30 **STEAM GENERATORS** — Catalog 1218—Describes packaged units 15 to 500 hp. Gives construction details of models for single or multiple fuel firing.—ORR & SEMBOWER, INC.

42 **SINGLE RETORT UNDERFEED STOKER**—Bulletin 350, 28 pages—Describes an efficient, compact, single retort stoker, mechanically driven either by electric or steam drive for burning successfully various grades of bituminous coal, 50 to 150 hp rated capacity. Replete with installation views and details. Many Southern plants described—DETROIT STOKER CO.

50 **BOILER - BURNER PACKAGE** — Form 2314—Tells the story of the Kewanee-Iron Fireman boiler-burner package for automatic firing with gas, oil or a combination of the two fuels.—IRON FIREMAN MFG. CO.

53 **SOOT BLOWERS**—Bulletin 1001—Condensed catalog of Vulcan rotary, wall-type, gun-type and long retractable soot blowers. Hand or power driven. Blow with steam or air. Includes brief description of automatic-sequential control. COPES-VULCAN DIVISION, Continental Foundry & Machine Company.

57 **STEAM GENERATORS**—Catalog— Describes a wide line of steam generators for all industry, up to 250,000 lb per hr and 850 psi—with a great deal of steam generation knowledge available for consultation.—THE WICKES BOILER CO.

67 **SINGLE-STAGE TURBINES**—Catalog 52-19R, 8 pages—Describes DeLaval single stage turbines for capacities to 1000 hp and steam conditions to 600 psig, 750°F—complete specifications and design features, governor and controls.—DeLAVAL STEAM TURBINE COMPANY.

76 **GAS BURNER** — Bulletin — Describes the Rectilinear gas burner, an application of the venturi principle which provides high input through narrow rectangular openings for firing — in a horizontal plane through fire doors or small openings over handfired coal grates or stokers — or for firing in a vertical plane on either side of stoker or oil burner.—THE WEBSTER ENGINEERING COMPANY.

86 **INCINERATORS** — Booklet, 16 pages—Describes Plibrico incinerators for all types of industrial and institutional refuse, as well as special types for special purposes. Standard sizes with capacities up to 4000 lb per hr.—PLIBRICO COMPANY.

88 **INDUSTRIAL BURNERS** — General Bulletin 751, 16 pages—Describes and illustrates industrial oil burners, gas burners, combination gas and oil burners for boilers, dryers, stills, retorts, kilns, etc., and fuel oil pumping and heating units which go therewith.—NATIONAL AIROIL BURNER CO.

91 **ELECTRICAL PRECIPITATORS FOR COLLECTION OF SOLID AND LIQUID MATTER**—Booklet—Describes the various types and applications of Cottrell and electrical precipitators for the collection of solid and liquid matter suspended in hot or cold gases giving complete engineering data and installation illustrations.—WESTERN PRECIPITATION CORP.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

109 **DEAERATING HEATERS, SPRAY TYPE**—Catalog W-101—Describes and illustrates Graver spray deaerating heaters and other types of Graver deaerating heaters—data covering performance, results and applications,—typical plant flow diagrams—accessory equipment.—GRAVER WATER CONDITIONING COMPANY.

116 **MOTOR PUMPS FOR BULK STATION SERVICE**—Form 7281—Describes and illustrates this unit in its various applications with cross-sectional views and engineering data.—INGERSOLL-RAND CO.

157 **SEWAGE PUMPS** — Bulletin 7600, 4 pages—Illustrates and describes vertical sewage pumps, float controls, alarms and starters, specifications and tables of approximate dimensions included, with line drawings and equipment photographs.—THE DEMING COMPANY.

183 **MULTI - STAGE CENTRIFUGAL PUMP**—Bulletin B-1400—Describes a line of horizontal multi-stage pumps, 2, 3, 4 and 5 stage, for low and medium capacities and high heads, for water and mildly corrosive liquids—cast iron, bronze fitted construction, standard, with alloy pumps available on special order.—PEERLESS PUMP DIVISION, FOOD MACHINERY & CHEMICAL CORP.

197 **ROTARY PUMP SERVICE**—Bulletin 100-2, 12 pages—A Service Manual covering installation, operation and maintenance of rotary pumps. Discusses installing foundation bolts, alignment, supporting vertical pumps, grouting, piping, rotation, packing, dismantling, assembly, starting, operating and stand-by.—WARREN STEAM PUMP CO. INC.

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227 **LIQUID LEVEL GAGES**—Bulletin 11-1-51—Describes gages for water level or liquid level, water columns and the like—bronze, all-iron, forged steel, stainless steel for all sorts of industrial, chemical and power plant service, with details as to available sizes, applications and installations.—ERNST WATER COLUMN & GAGE CO.

240 **HUMIDITY CONTROL** — Bulletin 302—Describes the new Type 190 Hygrostat which gives accurate humidity control—pneumatically operated and sensitive to the slightest changes.—POWERS REGULATOR CO.

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267 **EASY READING THROUGH LIQUID LEVEL INDICATOR**—Bulletin WG-1822—Gives the advantages of remote liquid level indicators reporting at convenient sight level, the levels in boilers, heaters, tanks and other vessels—up to 1500 psi.—YARNALL-WARING COMPANY.

279 **LIQUID LEVEL GAGES**—Unit 154, 4 pages—Illustrates and describes Jerguson reflex type liquid level gauges for indicating the liquid level in tanks, boilers, stills or any liquid containing vessels—discusses design, construction and application. —JERGUSON GAGE & VALVE CO.

282 **REMOTE READING BOILER WATER GAGES** — Brochure CO— Covers principles, construction and uses of the EYE-HYE remote gage for stationary and marine steam power plants.—RELIANCE GAUGE COLUMN CO.

298 **COMBUSTION INSTRUMENTS** — Bulletin R-40—Discusses the Ranarex CO_2 indicator and recorder, the Ranarex specific gravity indicator and recorder, the Ranarex furnace atmosphere indicator and recorder, Ranarex portable indicators and Ranarex instruments for special application—with illustrations, applications, full descriptions.—THE PERMUTIT CO.

PLANT EQUIPMENT—WELDING TOOLS—PROCESS SPECIALTIES

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309 **WIRE CLOTH**—Catalog, 103 pages— Gives wire cloth ranges and specifications for grades from 20 x 250 mesh up to 4" openings. Illustrates facilities for fabricating wire cloth parts and fabricated alloys.—THE CAMBRIDGE WIRE CLOTH CO.

312 **BRONZE BEARINGS AND BARS** —Catalog—Gives complete data on hundreds of sizes of completely machined and finished bronze bearings for machine tools, industrial equipment, electric motors of all kinds, makes and sizes; and tubular and solid bars of bearing bronze in a wide range.—THE BUNTING BRASS & BRONZE COMPANY.

331 **HYDRAULIC CYLINDER**—Bulletin 701, 28 pages—Describes a complete line of hydraulic cylinders and gives diagrams, photographs, charts and engineering data in explanation of the different types, with capacities up to 1500 psi steam and 3000 psi water working pressures.—LINDBERG ENGINEERING COMPANY.

338 **WROUGHT IRON FOR GAS AND COAL HANDLING**—A special report of particular value to those interested in obtaining increased life from their flue gas, coal handling and comparable equipment.—A. M. BYERS CO.

351 **STEEL GRATING AND TREADS**—Bulletin 2096 describes Blaw-Knox electroforged steel grating and treads, their advantages and typical successful applications.—GRATING DEPT., BLAW-KNOX DIV., BLAW-KNOX CO.

361 **FLEXIBLE DUCT**—Catalog C2-3—Describes a complete line of light flexible tubing for ventilation, fume removal, dust collection, materials handling, including heat and wear resistance type, in diameters from less than 1 to 30 in. For exhaust or blowing system. Resists most chemicals and gases.—FLEXIBLE TUBING CORP.

389 **METAL WORKING LATHE**—Catalog, 6 pages—Describes the complete Nebel line of basic, economical, engine lathes, extension bed gap lathes and removable block gap lathes, in swing sizes from 16 in. to 50 in. Complete engineering details concerning design and application.—NEBEL MACHINE TOOL COMPANY.

373 **FOOD AND LIQUID CONTAINERS**—Bulletin CAR-54—Describes the vacuum construction of AerVoID vacuum food and liquid containers and carriers—with complete information as to application, economies and accessories.—VACUUM CAN COMPANY.

382 **ASPHALT HEATER**—Bulletin 3041—Describes the details of combustion chamber, tubular heat exchanger and related auxiliaries of the Todd Thermo-Convective Asphalt Heater. Shows how this automatic, low maintenance, high efficiency unit is especially designed to heat asphalt economically.—COMBUSTION EQUIPMENT DIVISION, TODD SHIPYARDS CORPORATION.

386 **INCINERATORS** — Bulletin, 16 pages—Describes a series of incinerators with type and size for virtually every plant or institution, and for every industrial application.—PLIBRICO COMPANY.

PIPING, VALVES, FITTINGS STEAM SPECIALTIES, TRAPS

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421 **STEAM TRAPS AND AIR**—Bulletin 2021—Gives complete details on Y-Type strainers for the prevention of dirt and scale damaging or interfering with operation of automatic valves, regulators, controllers, steam traps, instruments and the like.—ARMSTRONG MACHINE WORKS.

433 **STEEL UNIONS**—Bulletin P-100—Describes the 150 lb SWP "Fig" steel union with the bronze seat, made by Dart Union Company, manufacturers of unions for over 55 years.—THE FAIRBANKS COMPANY.

439 **FITTING & FLANGE DIMENSIONS**—A varnished Dimensional Data Card—8½ x 11 in. gives condensed data on the essential dimensions of welding fittings on one side of the card and forged steel flanges, with bolting data on the other side.—TAYLOR FORGE & PIPE WORKS.

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497 **SEAL VALVES**—Bulletins FL and 51-S—Describe Okadee full flow valves with perfect seal for fluids and gases, with low pressure drop. Charts and engineering details. THE OKADEE COMPANY.

MAINTENANCE PACKING GASKETS, LUBRICATION

506 **PACKING IN GENERAL**—Garlock Catalog — Describes packings for high pressures and low pressures—for water, air, steam, acids, solvents, oil and other liquids and gases.—THE GARLOCK PACKING CO.

524 **BRONZE BEARINGS**—Catalog 43—Gives complete specifications of standard stock bearings for miscellaneous applications, for electric motors—and of tubular and solid bronze bars available in stock.—THE BUNTING BRASS & BRONZE CO.

533 **REMOVAL SCALE AND RUST**—Booklet 4304-R-13—Tells how to remove scale and rust, using Oakite Compound No. 32—giving greater safety, efficiency and higher load factor to various elements in all sorts of plants and operations.—OAKITE PRODUCTS, INC.

538 **RUST PREVENTIVE**—Form 252, 16 pages—Describes in detail the rust preventive coating Rust-Oleum, made by a special formula which includes process fish oil and essential rust-inhibiting pigments—applied by brush, dip or spray—available in all colors, including aluminum and white—450 to 800 sq ft per gallon coverage, prompt drying, economical use—for metal, wood, concrete, plaster and other surfaces.—RUST-OLEUM CORPORATION.

557 **PIPE CLEANING** — Booklet — Describes proven methods of cleaning pipes, ducts, conduits and other important water and liquid channels in plants and utility systems—to materially increase capacity and efficiency. Proven specialists in this field show successful methods.—ACE PIPE CLEANING CONTRACTORS, INC.

560 **SEALING AND PACKING COMPOUND**—Bulletin E-134—Describes a metallo-plastic sealing and packing compound, using molybdenum sulphide, to apply to steam, water, air and gas applications in valves, expansion joints, pumps and the like—self-molding, in plastic form, convenient, efficient, positive.—SURVENT, INC.

584 **ANTI-CORROSIVE PAINTS**—Bulletin, "The Application of Subex and Subalex Paints"—Gives the story of a complete paint system for weather, moisture and alkali protection, with details as to application.—SUBOX, INC.

572 **CLEANING BLAST FURNACE STOVES**—Bulletin 5182—Describes how fine dust deposits and other caking are removed from the checker works surface of blast furnace stoves without interruption of iron production.—DOWELL, INC.

576 **MECHANICAL SEALING**—Catalog 455-SB—A family album describing various types of dura seals designed to meet specific operating conditions—a complete reference guide book. — DURAMETALLIC CORP.

588 **PIPE JOINT COMPOUND**—PLS Bulletin—Gives full information on "John Crane" plastic lead seal—a never hardening, all-purpose compound for sealing and lubricating pipe joints, threaded connections, studs, gaskets, etc.—general, chemical, corrosive and refinery service, high or low temperatures and pressures. — CRANE PACKING CO.

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5-53-1

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4	7	11	16	30	42	50	53	57	67	76	86	88	91	109	116	187
193	197	227	240	255	267	279	282	298	305	309	312	331	338	351	361	369
373	382	396	418	421	433	439	470	475	482	497	506	534	533	539	557	560
564	572	576	588	603	609	618	621	676	682	716	734	740	774	777	804	826
833	907	916	931	994	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29
Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46
Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62	Q63
Q64	Q65	Q66	Q67	Q68	Q69	Q70	Q71	Q72	Q73							

Also send further information on following New Equipment (page 8)

E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16
E17	E18	E19	E20	E21	E22	E23	E24	E25	E26	E27	E28	E29	E30	E31	E32
E33	E34	E35	E36	E37	E38	E39	E40	E41	E42	E43	E44	E45	E46	E47	E48
E49	E50	E51	E52	E53	E54	E55	E56	E57	E58	E59					

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ENGINES, DRIVES
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603 **MONORAIL CASE STUDIES** — Monorail Case Study File—Gives a continuing file of case studies showing successful, engineered applications of monorail systems to a wide variety of materials handling problems.—AMERICAN MONORAIL CO.

609 **WIRE MESH CONVEYOR BELTS** —Handbook, 140 pages—Illustrates and describes conveyor and conveyor belt designs, the uses and specifications of wire mesh conveyor belts. Covers many industrial applications. Contains valuable metallurgical data.—THE CAMBRIDGE WIRE CLOTH COMPANY.

618 **HEAVY DUTY BELT FASTENERS** —Bulletin F-100—Describes Flexo belt fasteners for heavy duty use in joining conveyor and elevator belts.—FLEXIBLE STEEL LACING CO.

621 **POWER TRANSMISSION AND EQUIPMENT**—Catalog 46—Gives comprehensive details of a complete line of power transmission including V-Belt drives, flat belt drives, pulleys, gears, chains, sprockets.—Industrial Division of CONTINENTAL GIN CO.

675 **FLEXIBLE GEAR COUPLINGS**—Coupling Catalog C-4, 16 pages—Explains a revolutionary design, with its cost-cutting advantages and numerous typical applications. Gives typical plan drawings, specifications on standard types (Standard, Mill Motor, Vertical Shaft, Spacer, Floating Shaft), sizes ⅜ in. to 6 in., 4 hp to 600 hp per 100 rpm. Complete engineering information and drawings of special types.—SIER-BATH GEAR & PUMP CO. INC.

682 **SUPERCHARGE GAS ENGINES**—Bulletin L-68 — Describes vertical four cycle, 6, 7 and 8 cylinder, 15¾ x 22 in. stroke, Type L8 supercharged gas engine, giving complete specifications, standard and special equipment, weight, horsepower, operating characteristics and applications.—THE COOPER-BESSEMER CORP.

WATER TREATMENT, HEATING, VENTILATING, AIR CONDITIONING, REFRIGERATION, DUST & FUME CONTROL

716 **COOLING WATER TREATMENT**—Bulletin 18—Explains the Nalco 18 Method, which uses a new corrosion inhibitor in conjunction with low pH, to prevent scale and corrosion in large recirculating cooling water systems.—NATIONAL ALUMINATE CORPORATION.

734 **ROOF COOLING SYSTEMS**—Bulletin 30 and Supplement 30A—Describes how Watco roof-cooling systems reduce inside temperatures 10 to 30 degrees—giving greater comfort, better working conditions, and higher efficiency to workers during periods of warm and changeable weather—installed by contract or by plant personnel.—WATER COOLING CORP.

740 **ION EXCHANGERS**—Bulletin 3806 —Describes Cation and Anion exchangers—states their application and explains the necessary equipment for application to industrial processing.—THE PERMUTIT CO.

774 **AIR CONDITIONING** — Bulletin 196-A, 8 pages, describes refrigerating, ice making and air conditioning equipment and their services to industrial plants, with photograph and drawing illustrations. "Check List of Typical Frick Equipment."—FRICK CO.

777 **DEAERATING HEATERS**—Bulletin WC-110, 4 pages—Describes a spray tray type package deaerating heater for smaller steam generating plants. Discusses design, construction, operation and installation. Includes plant illustrations.—GRAVER WATER CONDITIONING CO.

ELECTRICAL

804 **CUBICLES, PANELS, ENCLOSURES**—Descriptive Booket—"Contract Manufacturing in Sheet Metals"—Describes job-fitted control centers, bus enclosures, cubicles, switchgear housing and other sheet metal assemblies for utility and industrial plants.—THE KIRK & BLUM MFG. CO.

828 **MECHANICAL RECTIFIERS**—Bulletin 5206 — Offers an illustrated explanation of the unequalled conversion efficiency of the mechanical rectifier in heavy-duty industrial applications. The bulletin defines this efficiency, and explains through curves and tables how efficiencies of 95 to 96% and above are achieved in the 50-400 volt (d.c.) range. I-T-E CIRCUIT BREAKER COMPANY.

833 **BRONZE BEARINGS FOR MOTORS** — Catalog 152 — Gives complete specifications of stock bronze bearings particularly intended for application to electric motors.—THE BUNTING BRASS & BRONZE CO.

MISCELLANEOUS . . . SAFETY, BUILDING EQUIPMENT, METALS

907 **SHEET METAL PANELS, CUBICLES, ETC.**—Descriptive Booklet—"Contract Manufacturing in Sheet Metals" describes job-tailored control centers, bus enclosures, cubicles, switchgear housings, panel and various other sheet metal assemblies for utility and industrial plant applications.—THE KIRK & BLUM MFG. CO.

916 **INTEGRAL DUST COLLECTORS** —Catalog 810—Describes the Aerotec integral dust collector for application to grinding, buffing and cutting machinery operations, and similar applications where a comfort or health hazard is involved.—THE THERMIX ENGINEERING CO.

931 **VACUUM CLEANING**—Form A-718 pictures a wide variety of plant cleaning and production jobs, through illustration of typical plants, done by Hoffman vacuum cleaning equipment.—U. S. HOFFMAN MACHINERY CORP.

984 **MULTICLONE MECHANICAL DUST COLLECTORS**—Booklet M-204—Describes, with illustrations and diagrams, the basic principles of dust recovery by mechanical means at maximum efficiency.—WESTERN PRECIPITATION CORP.

Continued on page 158

5-53-2

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E49	E50	E51	E52	E53	E54	E55	E56	E57	E58	E59					

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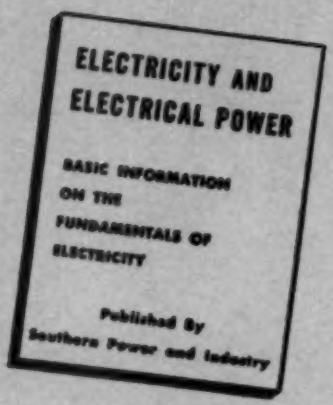

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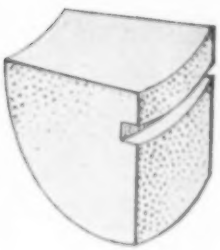

Nose arches for oil heaters were formerly made with special shapes of ordinary firebrick. Switching to quickly moldable Kaocast eliminated need for expensive special-shape inventory . . . minimized delays. In addition, side by side tests proved that Kaocast far outlasted the ordinary firebrick.

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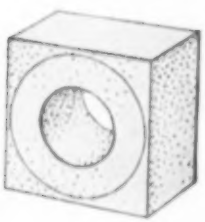

Kaocast was specified for the charging front of a forging furnace, used to heat heavy pipe ends. The reason? Kaocast linings were molded faster . . . give longer service, could be made when convenient and stored 'til needed.

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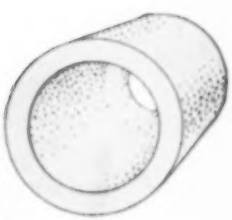

A chemical plant found that burner tile for a heating furnace made of an ordinary castable stood up only 3 to 4 months. But Kaocast burner tile stayed on the job 16 months and longer. Thousands of pounds of Kaocast have been used for this and many other applications in this plant.

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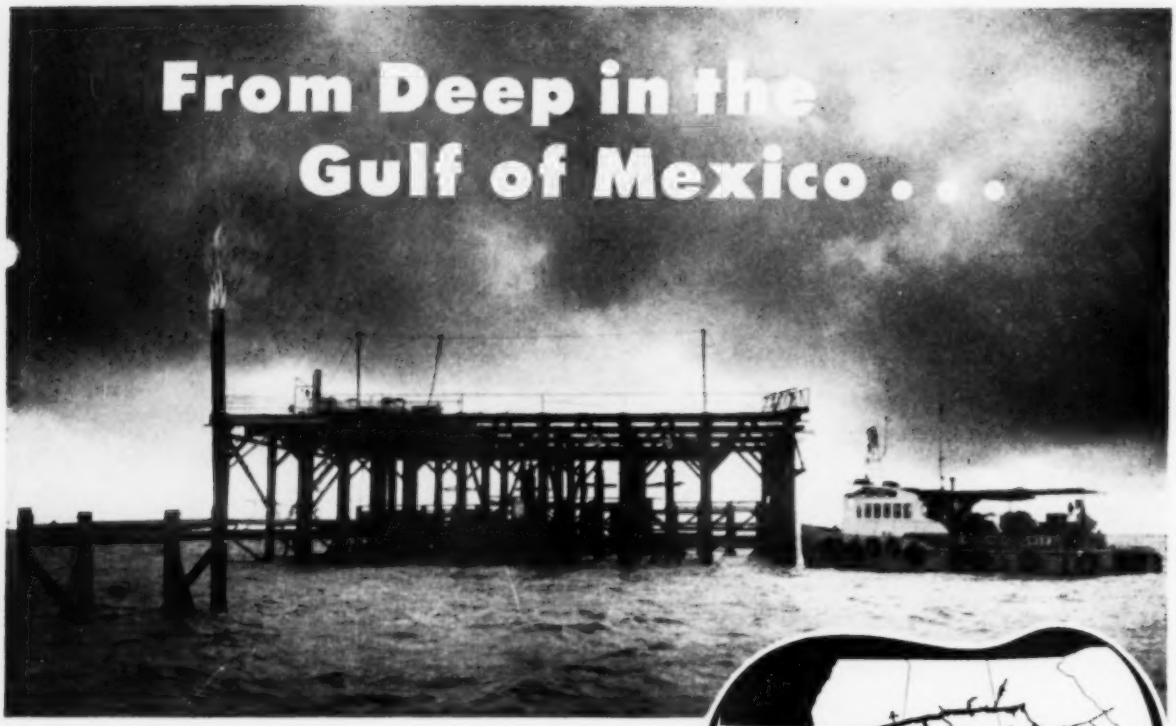

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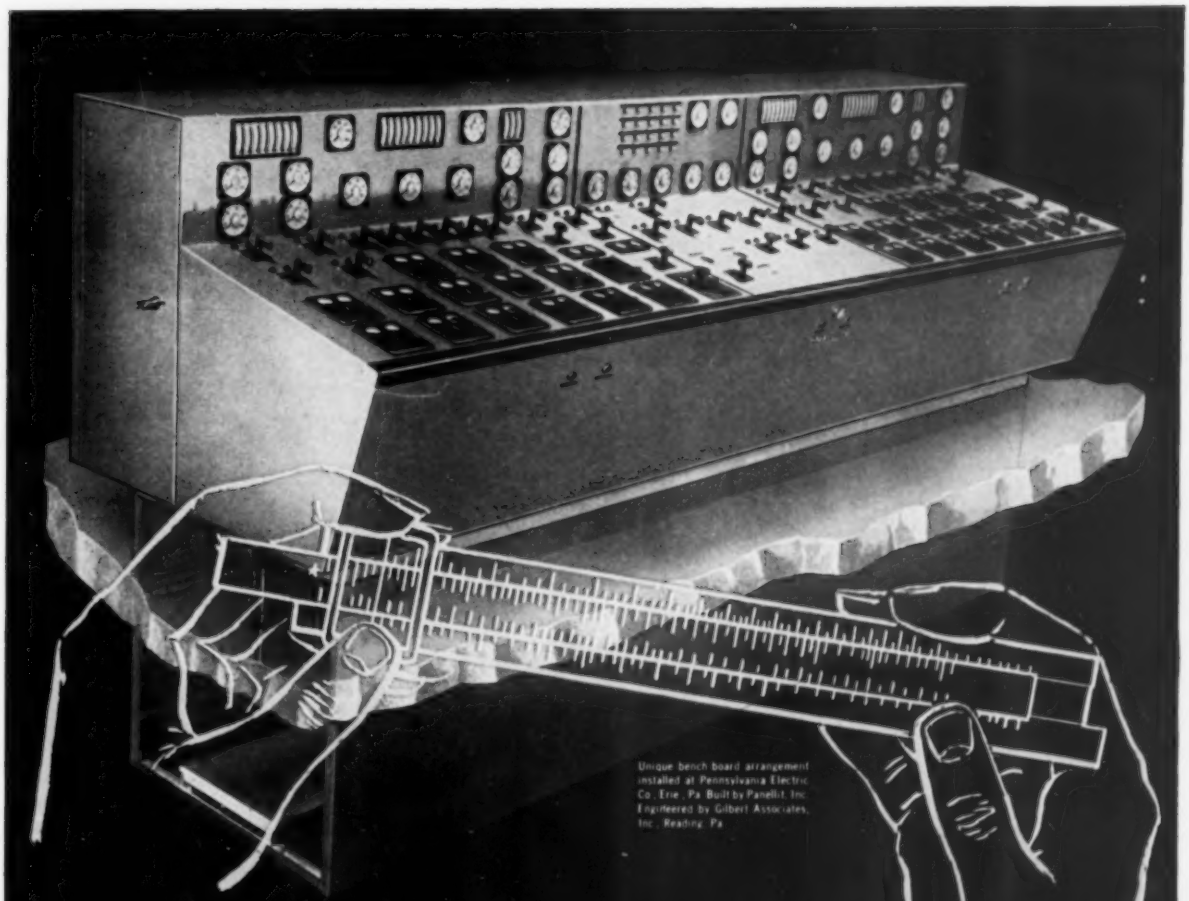

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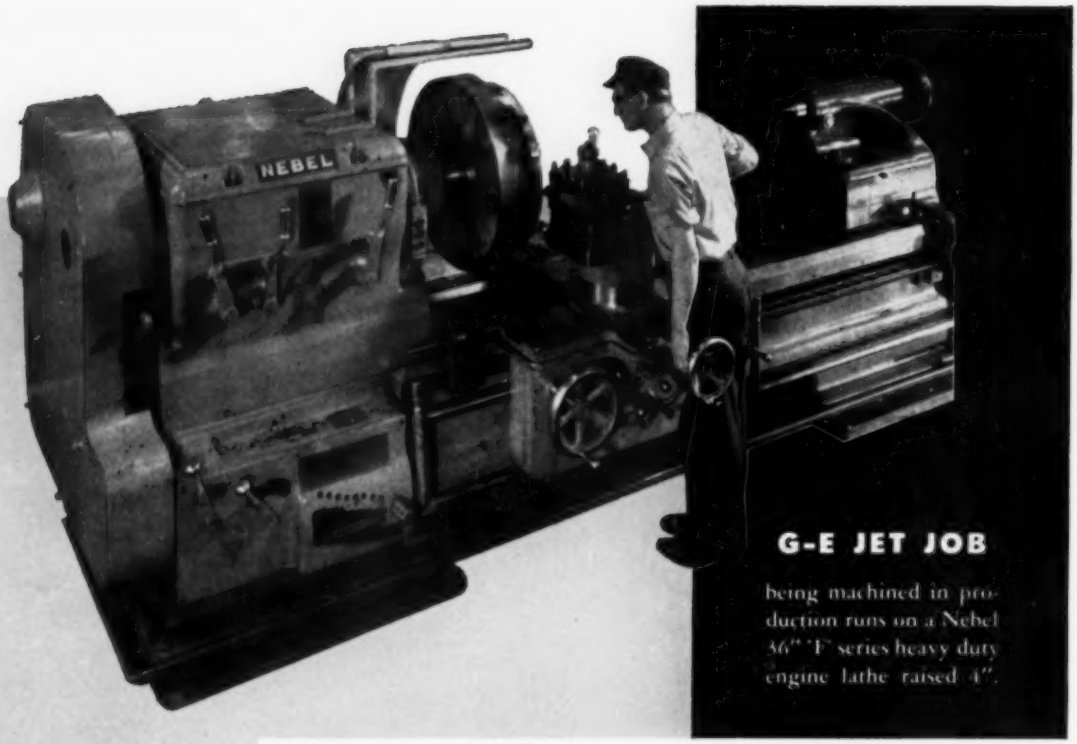
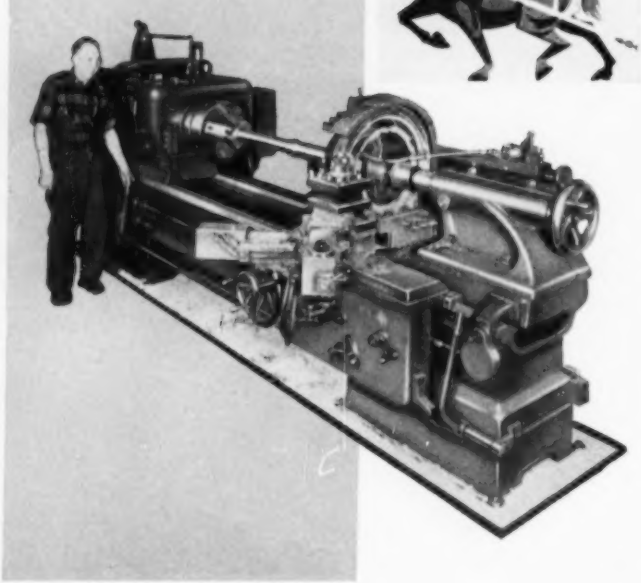


G-E JET JOB

being machined in production runs on a Nebel 36" 'F' series heavy duty engine lathe raised 4".

Nebel

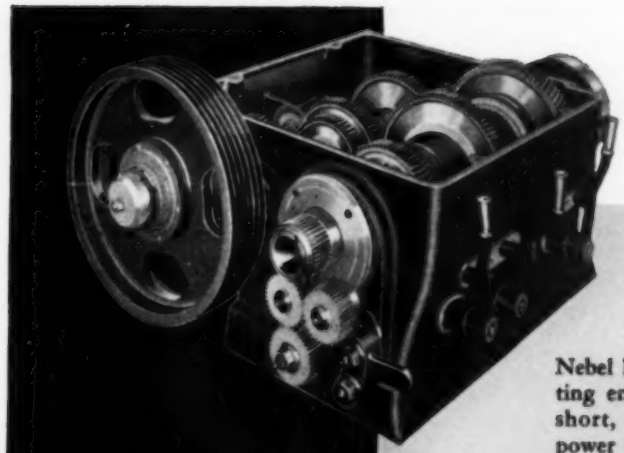


Substantial savings in time, effort and money are plus values Nebel customers have enjoyed for over 53 years. That's because Nebel lathes are basic, and so economical to buy and operate.

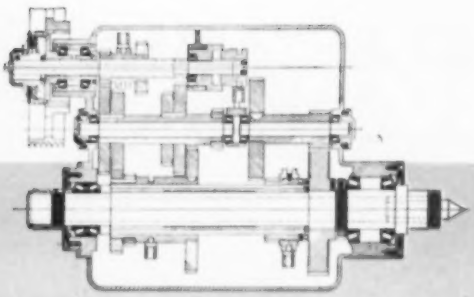
They're made in heavy duty engine, removable block gap and extension bed gap models, in swing sizes from 16" to 50".

Nebel lathes are proving themselves in difficult production assignments like the jet engine program and in exacting maintenance work aboard ships at sea. For such versatility and productivity, Nebel offers you these optional extras: hydraulic duplicating attachment (see opposite page), shaved and hardened headstock gears, hardened steel bed way inserts rapid traverse and others.

Why not send us your requirements today? We'll give you cost-cutting recommendations promptly.



HEADSTOCK POWERHOUSE



Nebel headstocks are dynamos of metal-cutting energy: wide husky gears mounted on short, splined shafts deliver tremendous power to the spindle. And the helical design of drive gears makes for an unbelievably smooth drive.

Spindle is supported on two double Timken anti-friction bearings. On the 'F' series shown above, the front bearings can carry a radial load of 11,495 pounds at 500 rpm and a thrust load of 11,005 pounds at 500 rpm. Note generous use of Timken bearings at all other vital points.

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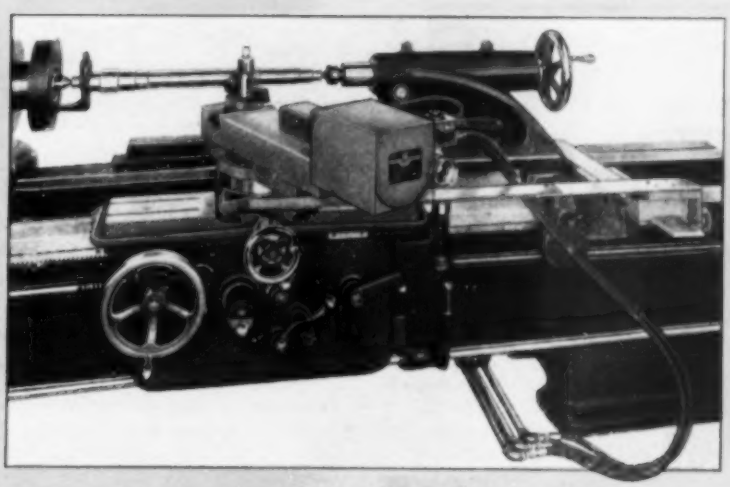

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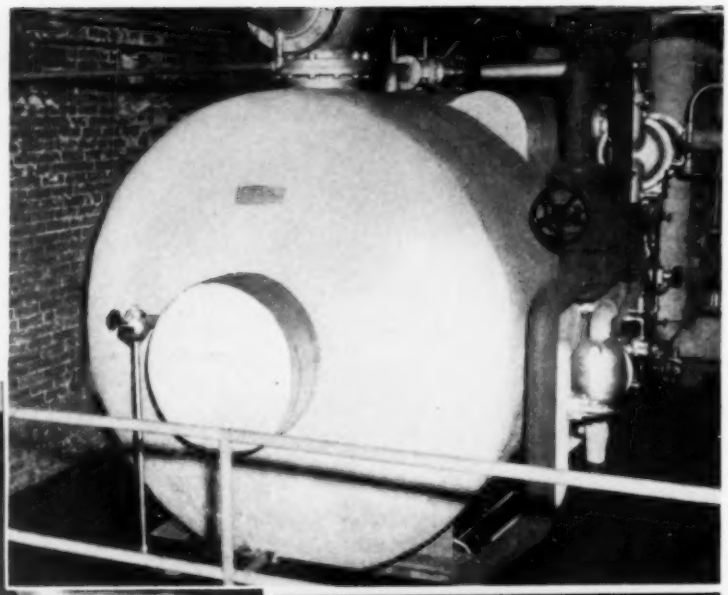

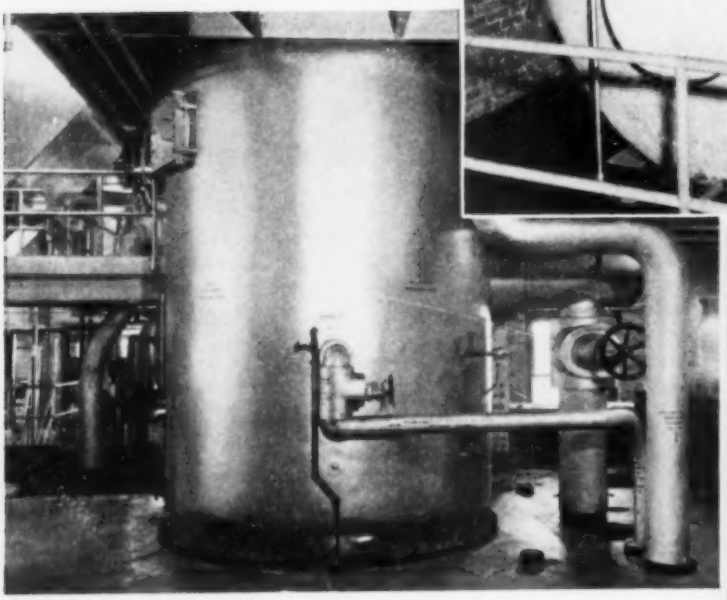

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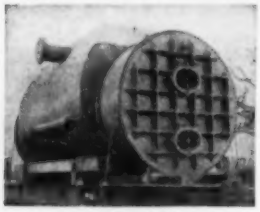
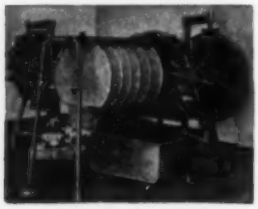


CONDENSERS



REFINER FILTERS

The two units shown here are installed in the central station of a large New England public utility. Each unit represents the very latest in engineering development and was designed and built by CONSECO. They are typical examples of CONSECO'S long, specialized experience on heat transfer equipment of all kinds.

VERTICAL

This vertical tray type Deaerating Feed Water Heater delivers 588,000 lbs. water per hour at a maximum of .005 cc per liter oxygen concentration. It is fitted with vent condenser and integral storage system. It operates with extraction steam.

HORIZONTAL

The horizontal unit illustrated is a tray type Conseco Deaerating Feed Water Heater delivering 150,000 lbs. of water per hour at maximum .005 cc per liter oxygen concentration. It was designed with an internal tray section having special construction arrangements to meet requirements of limited headroom.

CLOSED HEATERS

STEAM JET AIR EJECTORS

Send for illustrated literature. Ask Conseco Engineers for recommendations on condenser and heat exchanger equipment to meet your requirements and guaranteed to meet or exceed performance specifications.

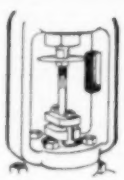
CONSECO **Condenser Service & Engineering Co.**
HOBOKEN, N. J.

Single wrench maintenance

check these time and money-saving maintenance features

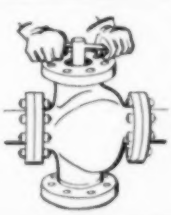
1 **CAST FLATS** make bolts easy to remove on superstructure. Heads can't turn . . . only one wrench needed.

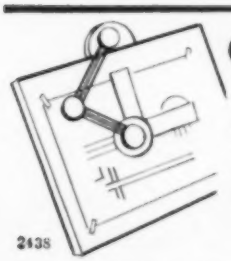
2 **WIDE YOKE**—plenty of room for big hands to work with that one wrench.



3 **FLATS** on valve stem use same adjustable wrench—does not score stem.

4 **SEAT RINGS** can be renewed without taking the valve body from the line. No vises, no lathes. Standard Leslie practice for 27 years, not a theory, a proven fact.



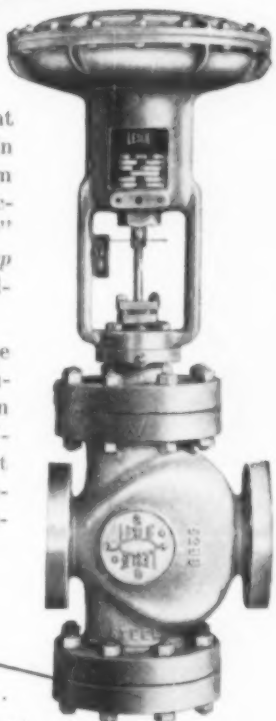


5 **INTERCHANGEABLE** parts keep inventory small, reduce down-time. Top grade materials and engineering means less maintenance.

2438

There are a host of important features found as *standard* in Leslie Double-Seated Diaphragm Control Valves usually manufactured only in "made-to-order" units — features that mean *top* performance and *extra*-dependable service.

But here's one more advantage that makes Leslie the most popular valve with maintenance men —SINGLE WRENCH MAINTENANCE. They find that maintaining the Leslie Double-Seated Control Valve is a one-tool job.



WHEN SPECIFYING . . .

for pressure, temperature and level controls, a quick check can prevent ordering a *special* that Leslie makes as *standard*. A call to your Leslie Engineer, before you specify, is free insurance. He's listed under "Valves" or "Regulators" in the classified telephone directories in principal cities.

Send for free Bulletin 5305

12 new pages of valuable data on double-seated diaphragm control valves.

TRADE LESLIE MARK

LESLIE CO., 261 GRANT AVE., LYNDHURST, N. J.

You can depend on Erie City for sound engineering
ERIE CITY IR

Here's Another

ERIE CITY VL STEAM GENERATOR

This one, fired by the Erie City Dumping Grate Spreader Stoker. Erie City VL's by the hundreds are serving a broad cross section of small to large steam users. These completely factory-assembled or field erected steam generators incorporate a 2-drum boiler and integral water cooled furnace for any mechanical firing method. We draw upon a 50 year experience with 2-drum boilers and a pioneering application of water wall design that keeps refractory maintenance to a minimum.

Only clean water can enter the integral water wall circulation. VL's are the most accessible boilers of this type—easy to keep clean and at top efficiency. Hospitals, Schools, Institutions, Dairies, Laundries, Industries and Process Plants use and repeat on VL's.

Stoker and 300 hp. VL boiler are shown combined but are shipped as two units.

A Few of the Hundreds of Erie City VL Users

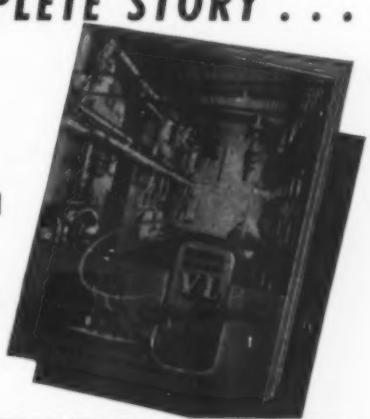
BORDEN CO.
DAIRYMAN'S LEAGUE
ARMOUR & CO.
KRAFT FOODS CO.
GENERAL MILLS CO.
REPUBLIC STEEL CORP.
BORG WARNER CORP.
ALUMINUM CO. OF AMERICA
GENERAL ELECTRIC CO.
UNION PACIFIC R. R. CO.
HERCULES POWDER CO.
ARCHER DANIELS MIDLAND CO.

ERIE CITY IRON WORKS • *Erie, Pa.*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS
UNDERFEED AND SPREADER STOKERS • PULVERIZERS

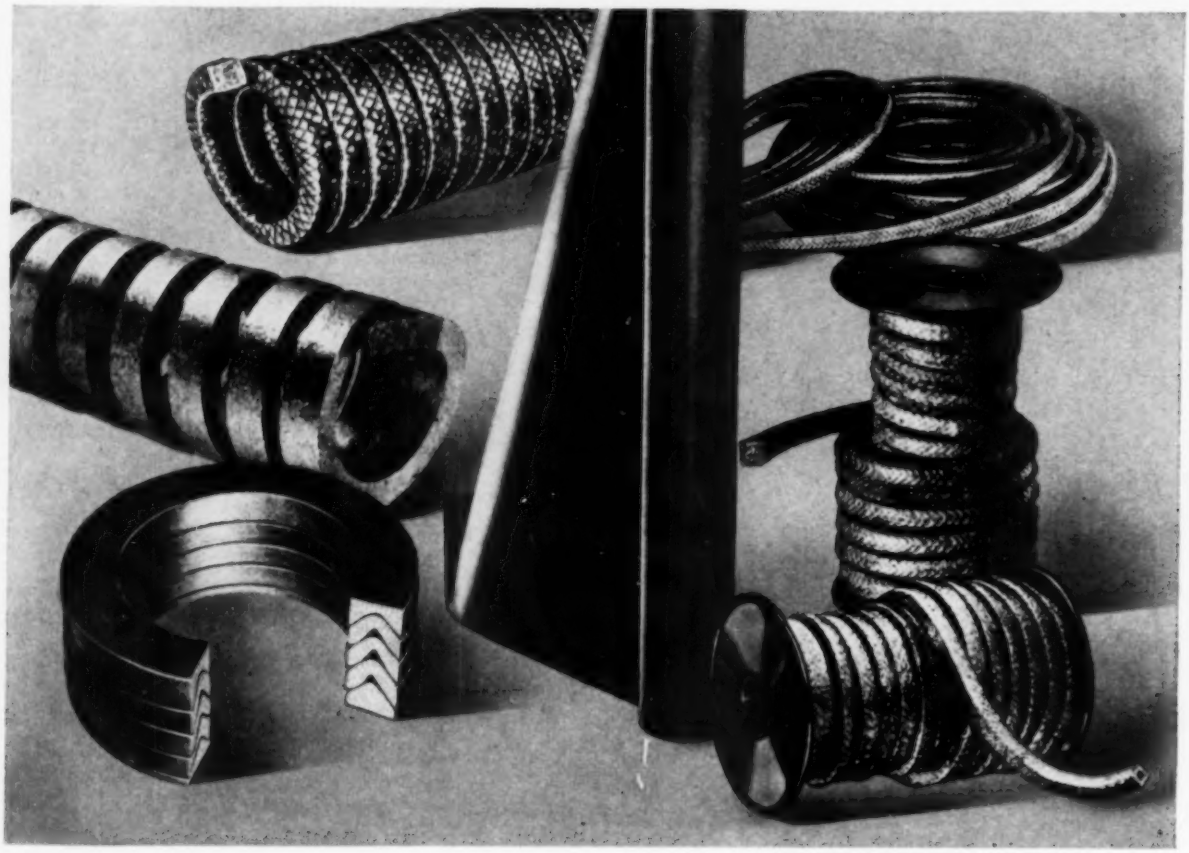
Get the **COMPLETE STORY . . .**

on this modern
2-DRUM
Steam Generator
for all mechanical
firing methods.
Ask for **SB-43E**



O N W O R K S • *Erie, Pa.*

NOW! 95% OF ALL PACKING NEEDS ARE MET WITH R/M's BIG 7



Lower inventories! Simplify ordering! Reduce downtime!

Don't labor any longer under the impression that you must carry 10, 20, 50 different types of packing. The whole idea is *obsolete* as of now! Unless you have a very rare packing application, just 3 or 4 of R/M's new "Big 7" Packing Types will probably meet every one of your requirements. Nothing less than an engineering feat—from raw materials through continuous manufacturing processes—has made this simplified approach to the packing problem possible. To accomplish it, R/M has drawn to the fullest extent on its 50 years of know-how and experience. It has utilized the research, testing and production facilities of all its seven great plants. You can count on these "Big 7" R/M Packing Types for superior performance every time. See your distributor for details. Let him show you how R/M Packings will lower your inventories, simplify your ordering, reduce your downtime.

R/M **PACKINGS**
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

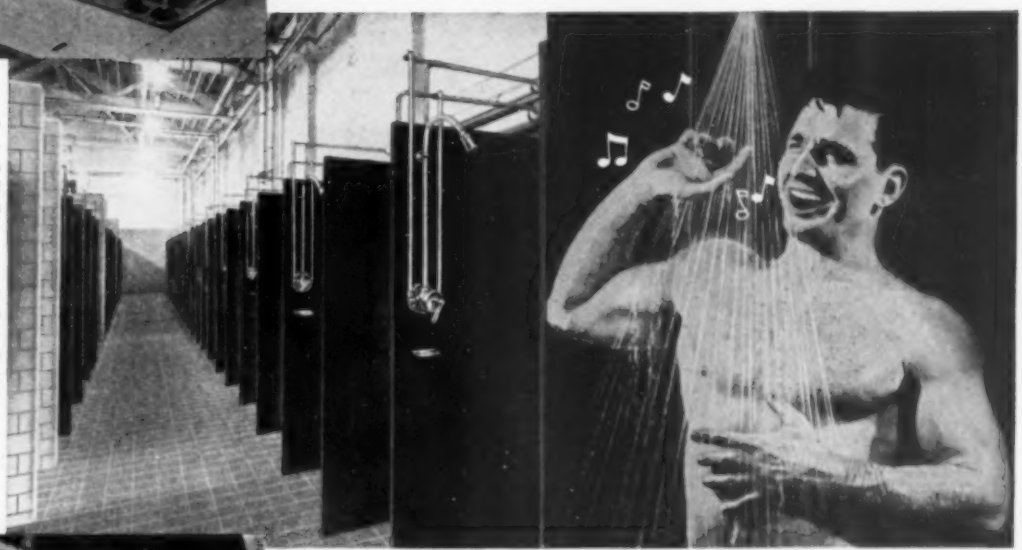
RAYBESTOS-MANHATTAN, INC., Manufacturers of Packings • Teflon Products • Asbestos Textiles • Industrial Rubber Products • Abrasive and Diamond Wheels Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Sintered Metal Products • Bowling Balls

Workers Sing in the Showers
Regulated by POWERS
at The SINGER MANUFACTURING CO.
Plant in Elizabethport, New Jersey

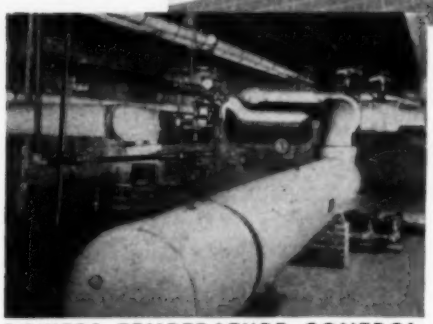
Above:
A magnificient new model in the already world-famous line of SINGER Sewing Machines

•

Right:
One of Singer's Shower rooms has 98 showers, another 58 and there are several smaller ones for individual groups.



Some of the 190 Clean, Modern Showers at The Singer Mfg. Co. Each shower is individually controlled by a



POWERS TEMPERATURE CONTROL on HOT WATER GENERATORS

serving the various shower rooms is shown above. For this type of service a Powers ACCRITEM Regulator and FLOWRITE Valve are often used.

When You Have Problems of Water Temperature Control contact Powers nearest office. With over 60 years experience and a most complete line of controls we are well qualified to help you.

Mixer for Exposed Piping

POWERS

Thermostatic WATER MIXER

The Best Showers that money can buy — is only one of the many reasons why employees remain almost twice as long with SINGER as the national average.

Mr. F. H. Gummick, Plant Engineer for this famous 100 year old firm, says "The Singer Mfg. Co. has provided employees with the best shower room equipment obtainable. We consider it an investment in good employee relations."

Powers Temperature regulators on each individual shower as well as on the hot water generators serving the showers is the best insurance for a SAFE, COMFORTABLE shower.

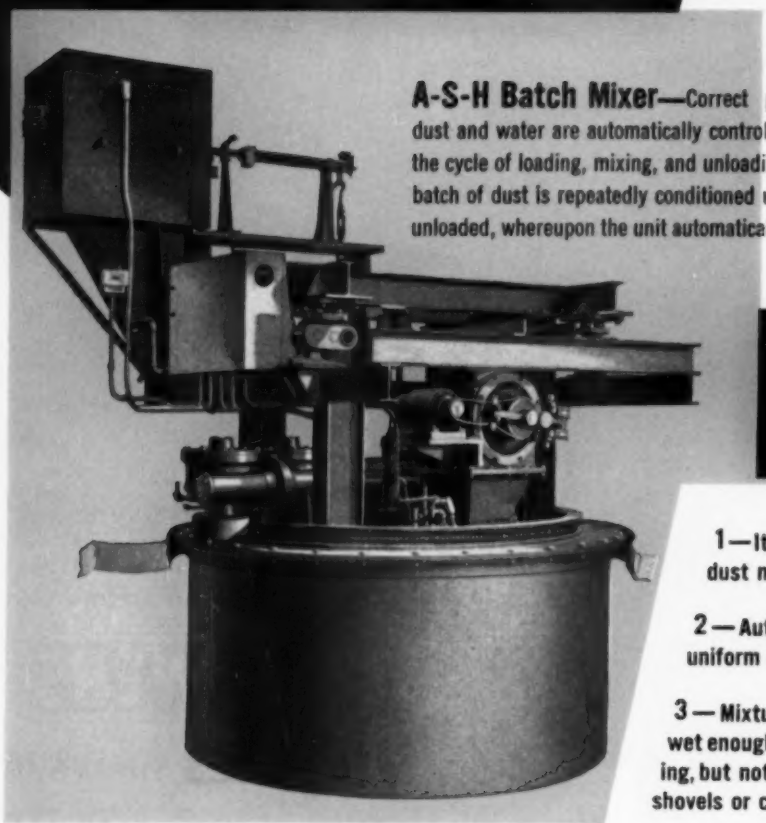
No Unexpected "Shots" of icy cold or scalding water here. Powers *thermostatic* water mixers always keep the water temperature just right — regardless of **pressure** or **temperature** changes in water supply lines. Write for catalog Rb24.

(b14) • *Only ONE Shower Accident Can Cost Many Times More Than POWERS Water Mixers* •

Established in 1891 • THE POWERS REGULATOR COMPANY • SKOKIE, ILL. • Offices in Over 50 Cities

1333 Spring St., Atlanta, Ga. 101 N. Elm St., Greensboro, N. C.

Keep your DUST under control



A-S-H Batch Mixer—Correct proportions of dust and water are automatically controlled, as well as the cycle of loading, mixing, and unloading. Batch after batch of dust is repeatedly conditioned until the silo is unloaded, whereupon the unit automatically shuts down.

Why Power Engineers are thinking in terms of the A-S-H Batch Mixer:

1—It completely eliminates local dust nuisance during unloading.

2—Automatic operation insures uniform results.

3—Mixture of dust and water is wet enough to handle without dusting, but not wet enough to stick to shovels or cars.

4—Requires a minimum of enclosed space for unloading area.

If you use trucks or railroad cars for dust disposal, the A-S-H Batch Mixer will make your operation cleaner from start to finish.

Designed to replace conventional continuous unloaders in critical areas, the A-S-H Batch Mixer gives complete protection against accidental release of dust. In addition, the end-product is ideal for handling and transport.

This A-S-H pioneering development can help you solve your air-pollution problem. Write us for further details.

THE ALLEN-SHERMAN-HOFF CO.
Dept. L—259 E. Lancaster Ave., Wynnewood, Pa.
Offices and Representatives in Principal Cities

HYDROJET (hydraulic) HYDROVAC (pneumatic)

materials handling systems

FOR SEVERE THROTTLING AND FLOW CONTROL SERVICES . . .

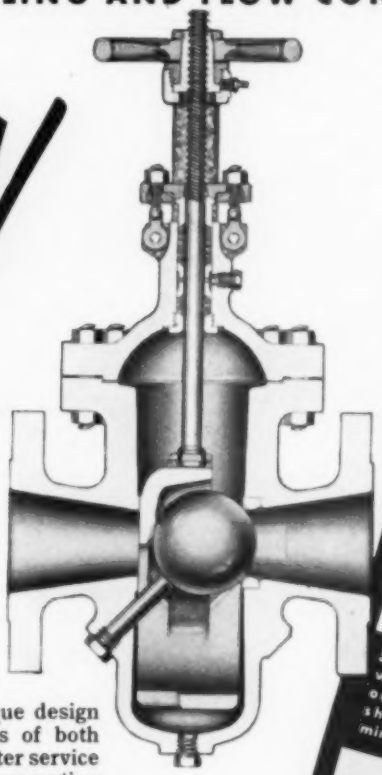
NEW

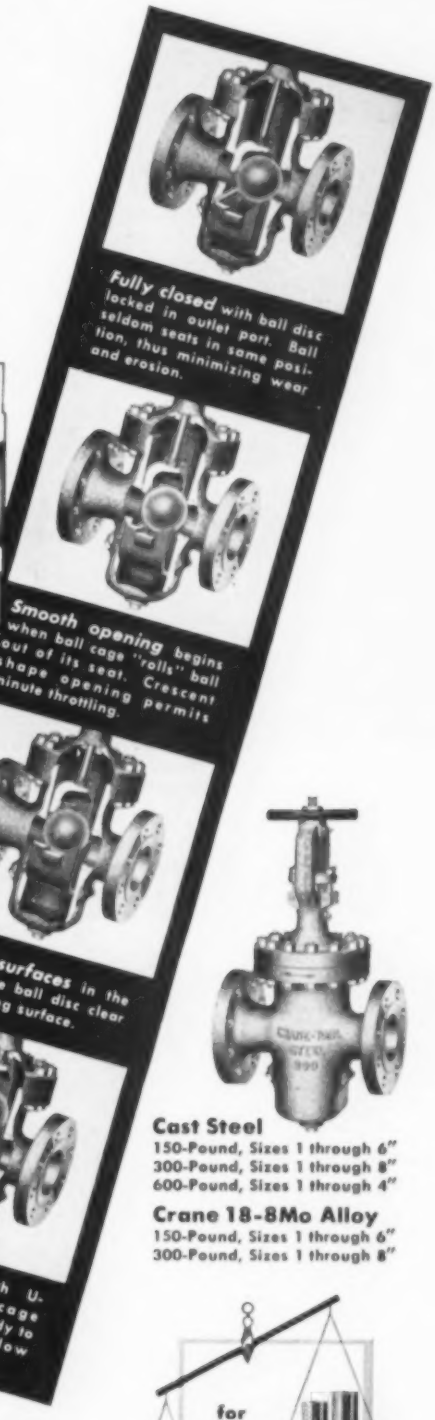
CRANE-PAUL
Venturi-Ball
VALVES

(Patented and Patents Pending)

CAST STEEL OR CRANE 18-8Mo ALLOY

Outside Screw and Yoke—Flanged. Available with sliding stem for assembly with power operators.




Fully closed with ball disc locked in outlet port. Ball seldom seats in same position, thus minimizing wear and erosion.
Smooth opening begins when ball cage "rolls" ball out of its seat. Crescent shape opening permits minute throttling.
Inclined surfaces in the cage lift the ball disc clear of the seating surface.
Fully opened with U-shaped bottom of cage bridging the gap in body to form a continuous flow passage.

Meet the Crane-Paul Valve—a unique design that combines desirable advantages of both gate and globe valves. It provides better service and longer life under more rigorous operating conditions than such valves normally stand. These features include—

Exceptionally accurate throttling with a minimum of wear and erosion, resulting in long-lived seating surfaces.

Straight-through, non-turbulent flow—with pressure drop characteristics approaching those of venturi-type gate valves.

Smooth, easy response throughout the entire range of operation.

Completely tight shut-off.

Heart of this new Crane-Paul Valve is a precision-ground ball disc which rides loosely in a cage direct-connected to the valve stem. In operation, the ball is moved to and from the center of flow and rolls into and out of the body seat. At no time during valve operation does the ball spin or chatter, even in closely throttled positions. It revolves just enough to provide a new seating surface each cycle. In the closed position, part of the ball actually protrudes into the outlet port where it is tightly seated by the wedging action of the ball cage.

Literature Sent on Request

Full information on this new Crane-Paul Valve is in your Crane 53 Catalog. Literature is available from your Crane Representative or on request to address below.

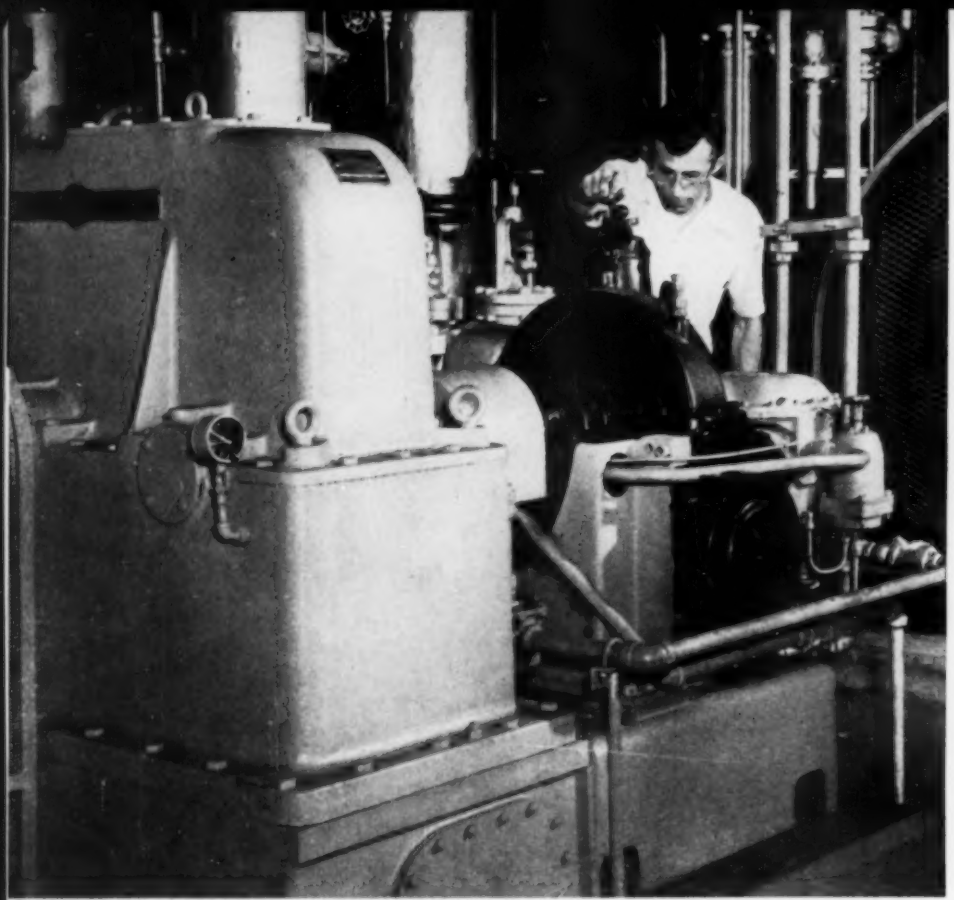
Cast Steel
150-Pound, Sizes 1 through 6"
300-Pound, Sizes 1 through 8"
600-Pound, Sizes 1 through 4"

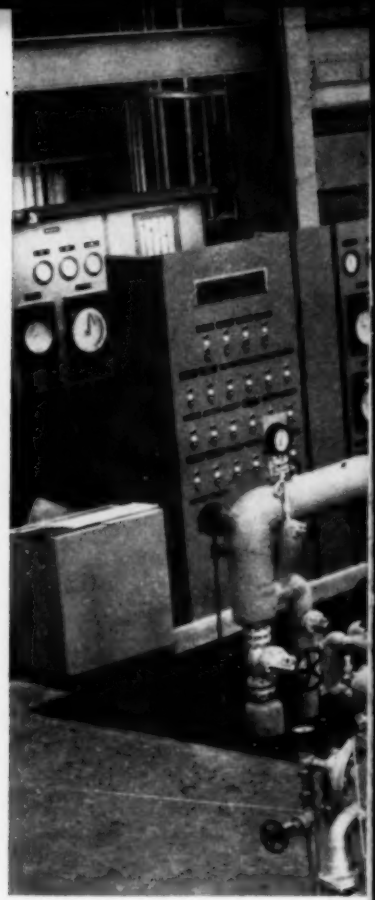
Crane 18-8Mo Alloy
150-Pound, Sizes 1 through 6"
300-Pound, Sizes 1 through 8"

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

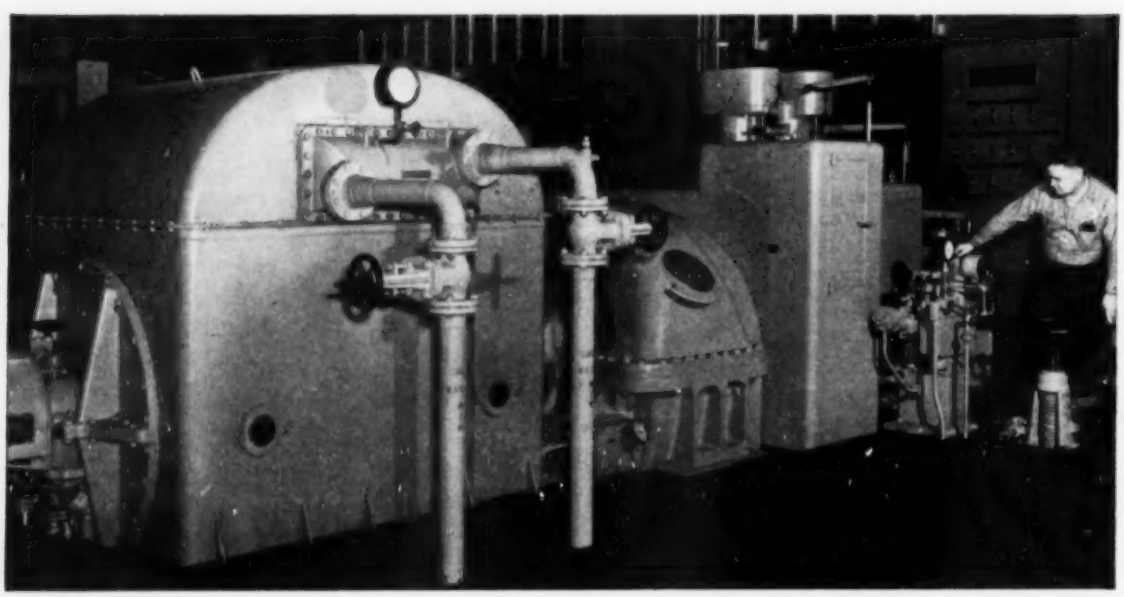
VALVES • FITTINGS • PIPE • PLUMBING • HEATING



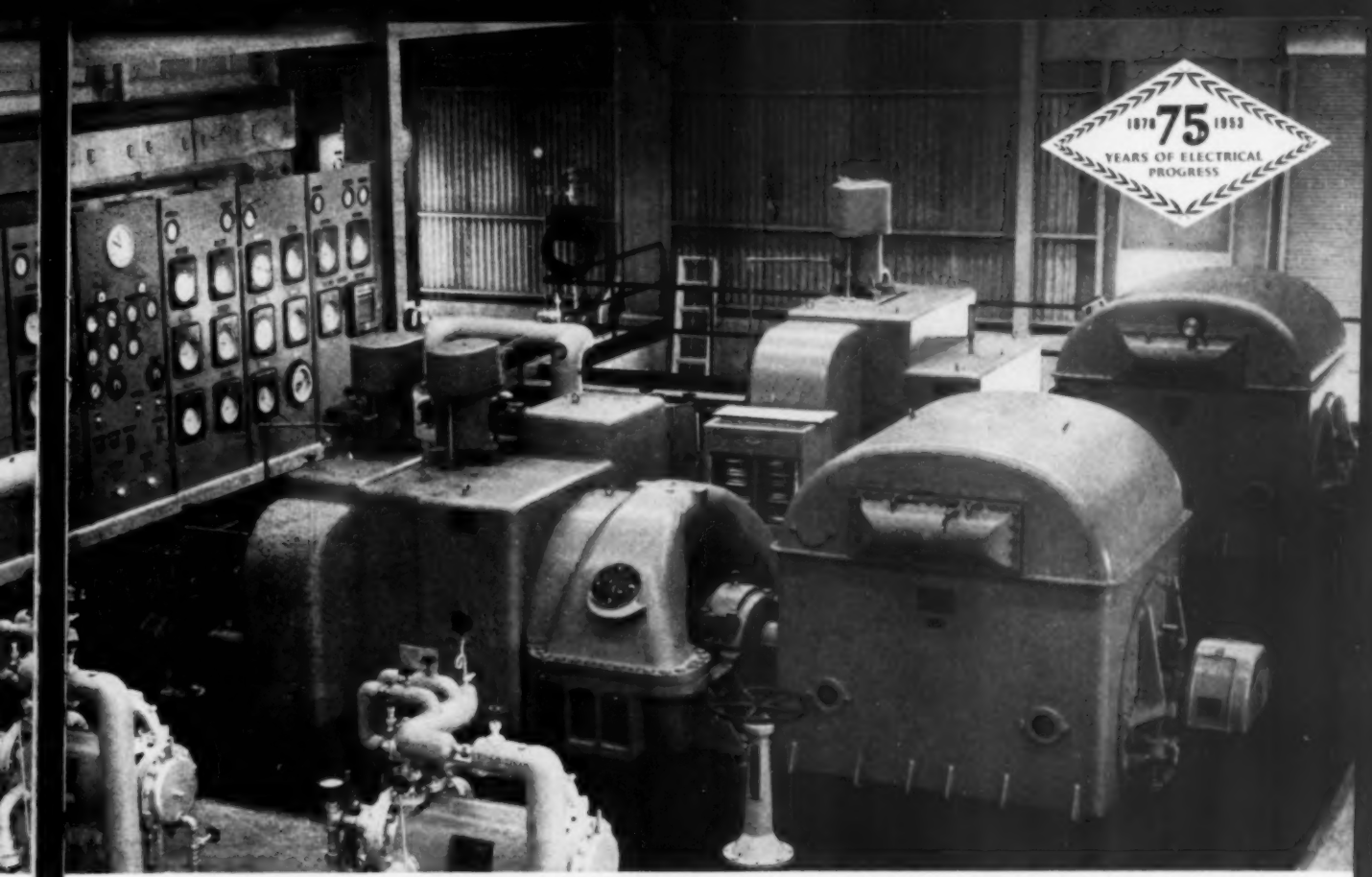


G-E TYPE DP MECHANICAL-DRIVE TURBINE, rated 135 hp, drives standby air compressors. J. A. Chamberlain, Supervisor of Utilities at Barber Refinery, checks turbine.

G-E Turbines Maintain Plant Steam



EASY STARTING of the General Electric 2000 KW double extraction turbine-generator at California's Refinery is demonstrated by W. E. Riley, Station Operator. Handwheel initiates small pilot valve, requires almost no muscle effort to operate.



DOUBLE-EXTRACTION CONDENSING TURBINE-GENERATOR in foreground supplies process steam at 150 psig and 15 psig for refinery operations at "California's" Barber, New Jersey plant. Other turbine is straight condensing.

Balance at "Calso's" Barber, N.J. Refinery

2000 KW Turbine-generators Reduce Boiler Steam to Process Pressures; Mechanical-drive Turbine with High-speed Precision Gear Drives Utility Air Compressor.

To make fullest use of available high-pressure steam, to obtain economical by-product power, and to automatically maintain plant steam balance over a wide range of steam flows, the California Refining Division of The California Oil Company selected two General Electric turbine-generators for its Number Two plant at the Barber, N. J. Refinery.

Extraction steam from one turbine-generator, a 2000 KW unit, is delivered at 150 psig and 15 psig for various process uses. Turbine governing accuracy is such that even when extraction steam or electrical load requirements vary, extraction pressures are held constant. A second 2000 KW unit exhausts to a condenser.

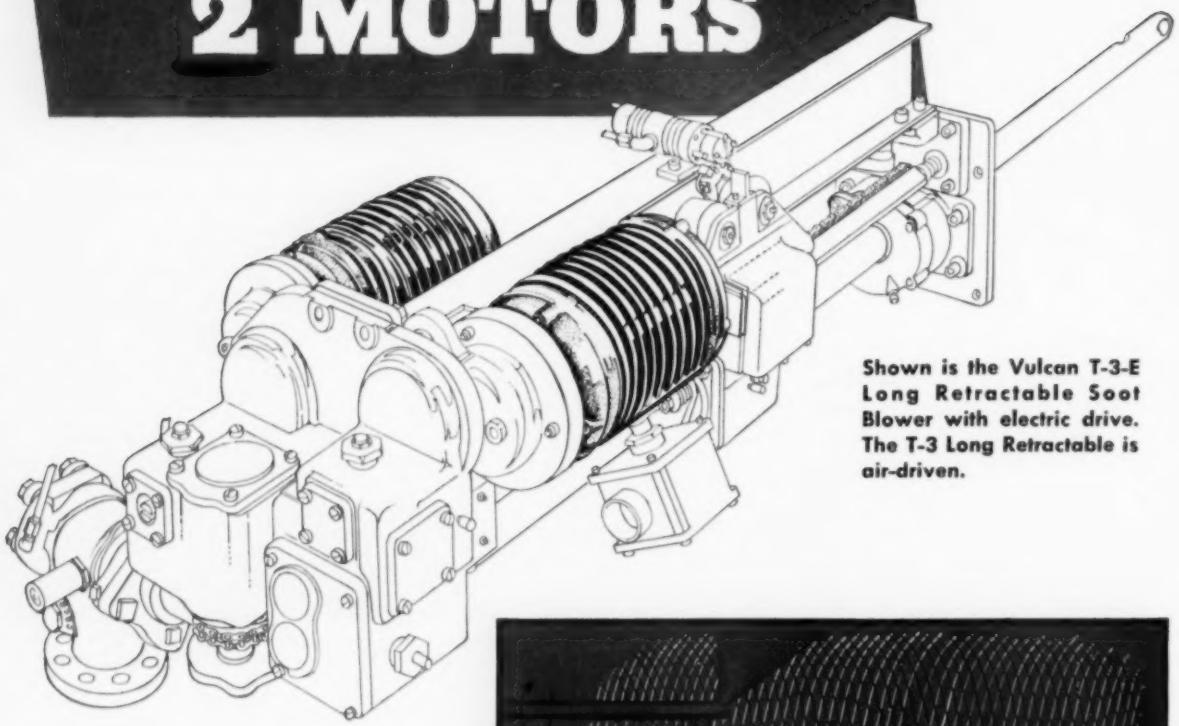
The "California" Refinery also installed a General Electric Type DP mechanical-drive turbine with a G-E high-speed precision gear to drive one of the compressors which furnishes utility air for use throughout the refinery. In an emergency, this turbine-driven compressor could meet complete compressed air demands.

If your plant uses process steam, why not take advantage of G.E.'s experienced turbine engineering resources. G-E engineers will study and recommend ways for you to best utilize steam supply. Get more for your turbine dollar with G-E turbine-generators. General Electric, Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

Why VULCAN uses 2 MOTORS



Shown is the Vulcan T-3-E Long Retractable Soot Blower with electric drive. The T-3 Long Retractable is air-driven.

THIS CLEANING PATTERN—an infinite number of double-helix paths—makes the second motor of a Vulcan Long Retractable Soot Blower a most profitable investment. Two motors cost more—but they are worth more.

To get such thorough cleaning—with the blowing steam or air always cleaning a new path—you must have two motors. One motor moves the lance in and out—the other rotates it. And with the two motors, traversing and rotating speeds are independently adjustable for your exact needs.

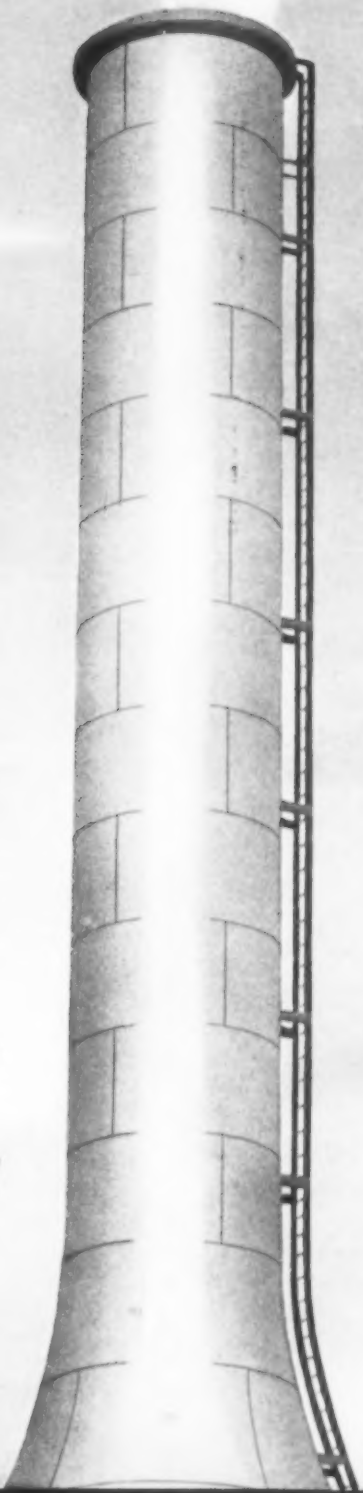
This double-helix pattern cuts tube replacement costs. There is no danger of the blowing medium constantly striking—and wearing away—the same part of each tube. Packing life is increased.

These are reasons why Vulcan "Long Retracts" are found on so many new high-duty boilers. Users know Vulcans pay for themselves quickly and often. The story is told in Bulletin 1002. Write for it.

COPES-VULCAN DIVISION
CONTINENTAL FOUNDRY & MACHINE COMPANY
ERIE 4, PENNSYLVANIA

VULCAN *Automatic Soot* **BLOWERS**

American Blower . . . a time-honored name in air handling



Look at the almost total absence of fly ash from this stack. This is due to an American Blower Fly Ash Precipitator. On a given application, as the load falls off and fly ash becomes harder to catch, this precipitator automatically maintains a higher efficiency than any other collector of mechanical type.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

Serving home and industry

AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS & WALL TILE · DETROIT CONTROLS · KEWANEE BOILERS · ROSS HEATER

American Blower . . . a time-honored name in air handling

Complete fan assembly

Wheel and shaft assembly

SIROCCO INDUCED DRAFT FAN

Memo to Power Plant Men:

You can handle more gas per revolution at lowest tip speed with Sirocco Multi-Blade Fans than with any other type. Designed and proportioned especially for induced draft work, their operating characteristics make them particularly adaptable to your modern power plant needs.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

Serving home and industry

AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS & WALL TILE · DETROIT CONTROLS · KEWANEE BOILERS · ROSS HEATER

RUGGED, LOW COST AIR CYLINDER WITH BUILT-IN VALVE SETS NEW STANDARDS FOR FAST, PRECISION OPERATIONS

Built-in electrical operating controls, built-in 4-way valve, built-in dual piston rod speed regulators, all with a single air connection, simplify installation of economical pneumatic circuits.

Any repetitive push, pull or lift movement now done manually can be performed infinitely faster, safer, and at lower cost with this unique, electrically-controlled Bellows Air Motor. The range of work it can do is limited only by the imagination of the tool designer or production engineer.

Unlike conventional air cylinders which require separate remote valves and cumbersome piping, The Bellows Air Motor is a complete power unit. It is compact, fits into crowded quarters, on moving machine elements. It is fast, responds to a starting impulse instantly. It is safe. Its low voltage operation simplifies wiring. It is sturdy, records of 10,000,000, 15,000,000, even 30,000,000 cycles without maintenance or repairs are commonplace.

The Bellows Air Motor is made in a wide range of mounting styles; in five bore sizes to meet varying power requirements; and in standard stroke lengths up to 48". For mechanical or manual operation the Air Motor can be equipped with a built-in manual valve, or for operation in explosive-hazardous areas with the built-in explosion-proof electrically controlled valve.

The Bellows Air Motor gives you an entirely new conception of the productive possibilities of air power. In the thousands of manufacturing plants where it is in use, it is establishing daily new records for cost reduction and improved productive efficiency. In metal working, in plastics, in woodworking, in any industry you can name, these versatile power units are sparking the imagination of cost conscious production men looking for ways to do old and new jobs better.

WRITE FOR THIS FREE 36-PAGE BOOKLET

THE STORY OF "CONTROLLED-AIR-POWER"—HERE IN THESE QUICK-READING PAGES IS WHAT IT IS DOING FOR OTHERS—WHAT IT CAN DO FOR YOU. THERE IS NO COST, NO OBLIGATION. ADDRESS: DEPT. SP-553, THE BELLOWS CO., BELLOWS BLDG., AKRON 9, OHIO. ASK FOR BULLETIN CL-50.

The Bellows Co.
AKRON 9, OHIO

1464-1

BELLOWS "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

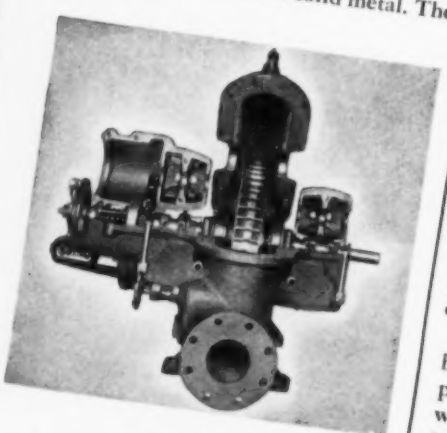
TERRY

The rotor of a Terry Solid-wheel Turbine is a single forging of special composition steel. It is first rough turned in two operations, as illustrated, and then two cuts are taken to mill the semi-circular buckets from the solid metal. The wheel at the top has been finished, ready for mounting on the shaft. *The result is a single-piece wheel with no parts to loosen or work out.*

As the only function of the blades is to form a series of pockets, wear of the blades is of little consequence and does not materially affect the horsepower or efficiency. The important part of the bucket is the back, or bottom, which is a solid forging.

It is impossible for the blades to foul. They have large clearances, and are further protected by the projecting rims at the sides of the wheel. As the side clearances are also very large, end play can do no harm.

The Terry Solid-wheel Turbine is an extremely reliable piece of equipment. Why not write for complete details today?



THE TERRY STEAM TURBINE CO.
TERRY SQUARE, HARTFORD 1, CONN.

TT-1188

Memo

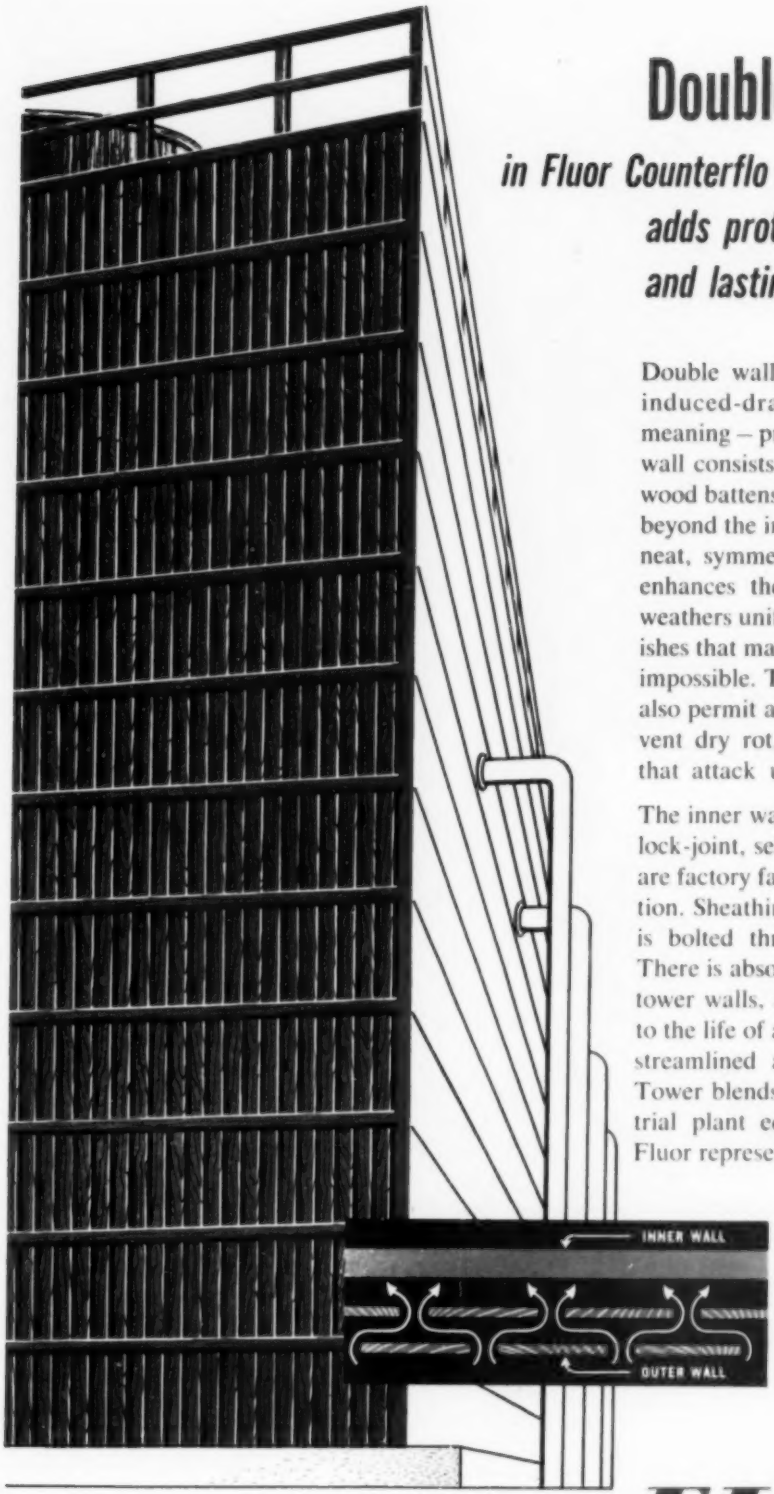
Send for a copy of bulletin S-116 which describes the many advantages of the Terry Solid-wheel Turbine.

Double wall sheathing

in Fluor Counterflo Cooling Towers adds protection and lasting good looks

Double wall construction provided on Fluor induced-draft cooling towers has a double meaning – protection and beauty. The outer wall consists of a double row of vertical Redwood battens which are located four inches out beyond the inner wall. This protective casing is neat, symmetrical, eye appealing and greatly enhances the beauty of a cooling tower. It weathers uniformly. Unsightly stains and blemishes that mar a cooling tower's appearance are impossible. The equally spaced rows of battens also permit air circulation around walls to prevent dry rot, algae growth and other blights that attack unventilated cooling tower walls.

The inner wall is constructed from 1 x 6 full Z lock-joint, select "heart" Redwood. Both walls are factory fabricated into panels for easy erection. Sheathing is not nailed to outer posts but is bolted through the main tower columns. There is absolutely no structural load borne by tower walls, another factor which adds length to the life of a Fluor Cooling Tower. The neat, streamlined appearance of a Fluor Cooling Tower blends well with today's modern industrial plant equipment. Contact your nearest Fluor representative, or write for details.



Top view of double wall. The uniform spacing of vertical battens is not for the sake of appearance alone. Air is permitted to circulate between the aerators to prevent dry rot and living organisms from attacking tower walls.

BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD.
LOS ANGELES 22, CALIFORNIA

FOREIGN: FACTS-FLUOR, PARIS
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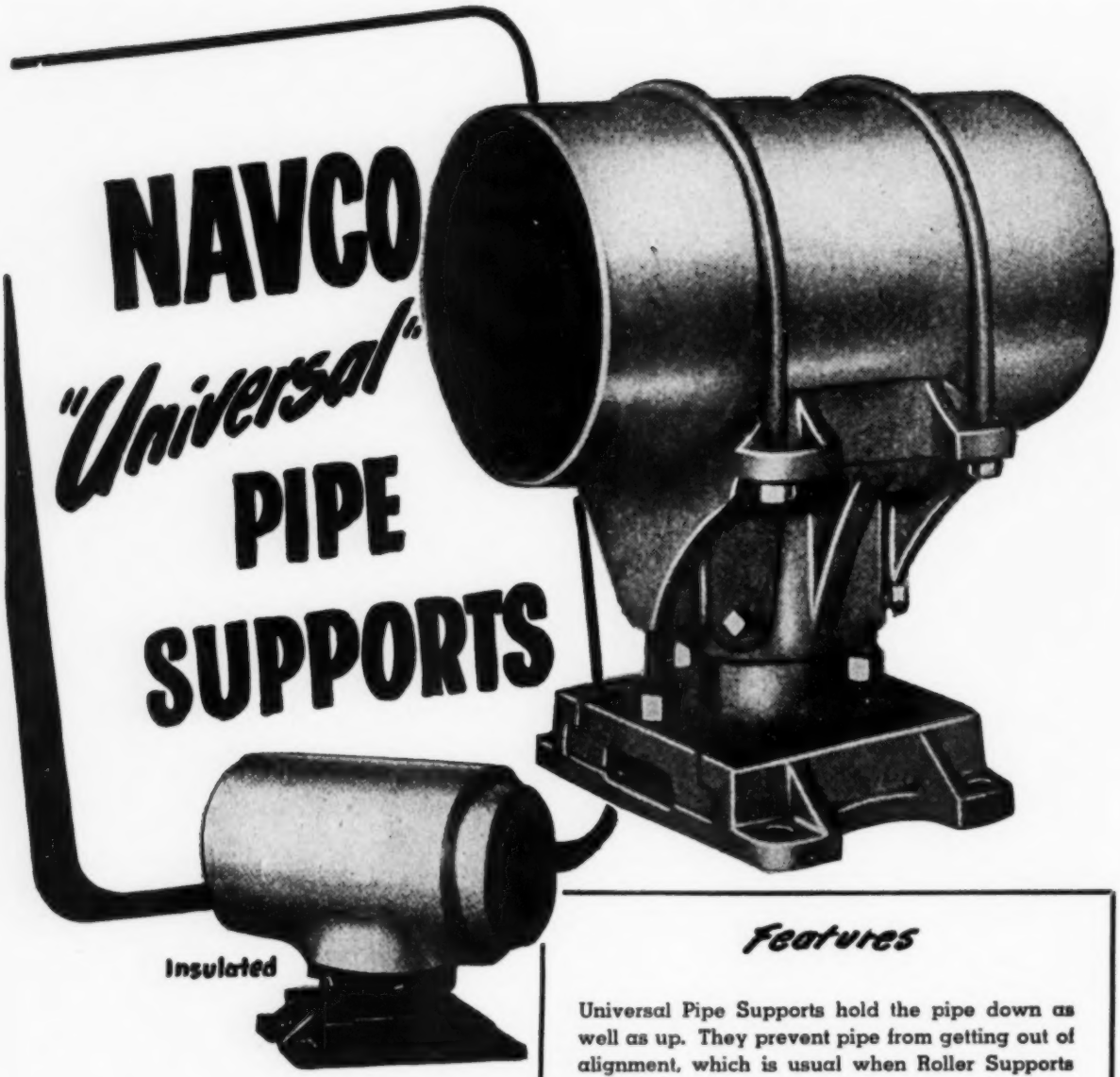
NAVCO "Universal" PIPE SUPPORTS



Vertical adjustment up to 2½ inches can be made.

Support may be turned to any angle of 360°.

Will take care of 8 inches of travel.

Features

Universal Pipe Supports hold the pipe down as well as up. They prevent pipe from getting out of alignment, which is usual when Roller Supports are used.

They permit control of expansion movement and insure the desired free action of Slip Expansion Joints so essential in tunnel and duct work.

Expansion movement of pipe will not disturb the insulation.

Made in Cast Iron or Steel and provided with forced lubrication for lines exposed to the weather.

NAVCO

NAVCO PIPING

NATIONAL VALVE & MANUFACTURING COMPANY • PITTSBURGH, PA.

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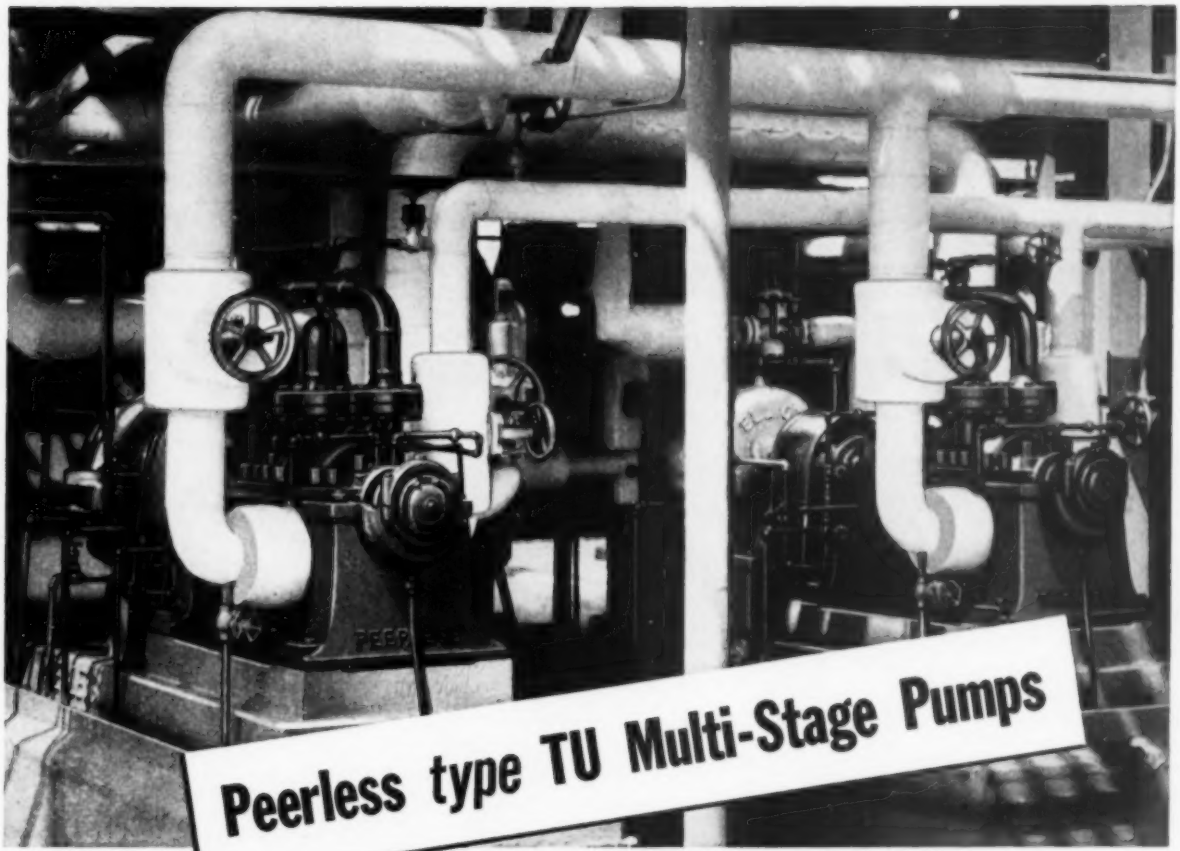


Peerless type TU Multi-Stage Pumps

PEERLESS PUMPS

4 COST-SAVING FEATURES OF THE TYPE TU LINE

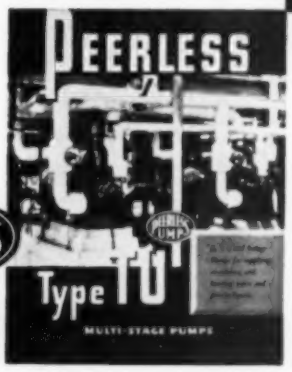
- *SIMPLICITY IN DESIGN*
- *GOOD HYDRAULIC CHARACTERISTICS*
- *DURABLE, RUGGED CONSTRUCTION*
- *ON-THE-JOB DEPENDABILITY*

2, 3, 4 AND 5-STAGE PUMPS FOR SUPPLYING CIRCULATING AND BOOSTING WATER AND PROCESS LIQUIDS AGAINST MEDIUM AND HIGH HEADS. Put these dependable pumps to work for you. They'll deliver high maintained efficiencies over an extended service life. Their split-case design makes them easy to service and maintain. Their precision construction guarantees year after year durability. In all sizes 4" and under, cross over between stages is built integral with upper pump case. Over-size shafts, wear rings, shaft sleeves, heavy duty ball bearings, modern case and impeller design are outstanding features. Choose from many types and sizes for all head and capacity requirements.

PROFUSELY ILLUSTRATED BULLETIN. A new 4-color bulletin describes the Peerless Type TU pumps. It's complete with pump cross-section, dimensional drawings and load-capacity data. Use coupon below.

GENERAL SPECIFICATIONS

HEADS	Up to 1600 Feet
CAPACITIES	Up to 3000 GPM
TEMPERATURES	Up to 300°F
CASE PRESSURES	Up to 800 Lbs.
HP RANGE	Up to 325 BHP
DRIVES	All Types
CONSTRUCTION	Cast Iron, Bronze, Stainless



MAIL COUPON FOR NEW BULLETIN

PEERLESS PUMP DIVISION
Food Machinery and Chemical Corporation
301 West Avenue 26, Los Angeles 31, California

Please send a copy of TU Pump Bulletin No. B-1400 to:

NAME_____

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S.P.I.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION

Address inquiries to Factories at:
Los Angeles 31, Calif. & Indianapolis, Ind.
Offices: New York; Chicago; Indianapolis; St. Louis; Atlanta; Tulsa; Plainview and Lubbock, Texas; Fresno; Los Angeles; Phoenix; Albuquerque, New Mexico.
Distributors in Principal Cities; Consult your Telephone Directory

PEERLESS PUMPS fmc

Coal Handling and Coal Firing

Dries and preheats coal for instant ignition and uniform distribution

A mixture of air and hot furnace gases is used for drying the coal and conveying it to the furnace grates. When the dry coal reaches the distributor nozzle it is properly conditioned for uniform distribution, and is also preheated to the point where almost instant ignition is assured.

1

Conveys coal automatically. No special handling equipment required

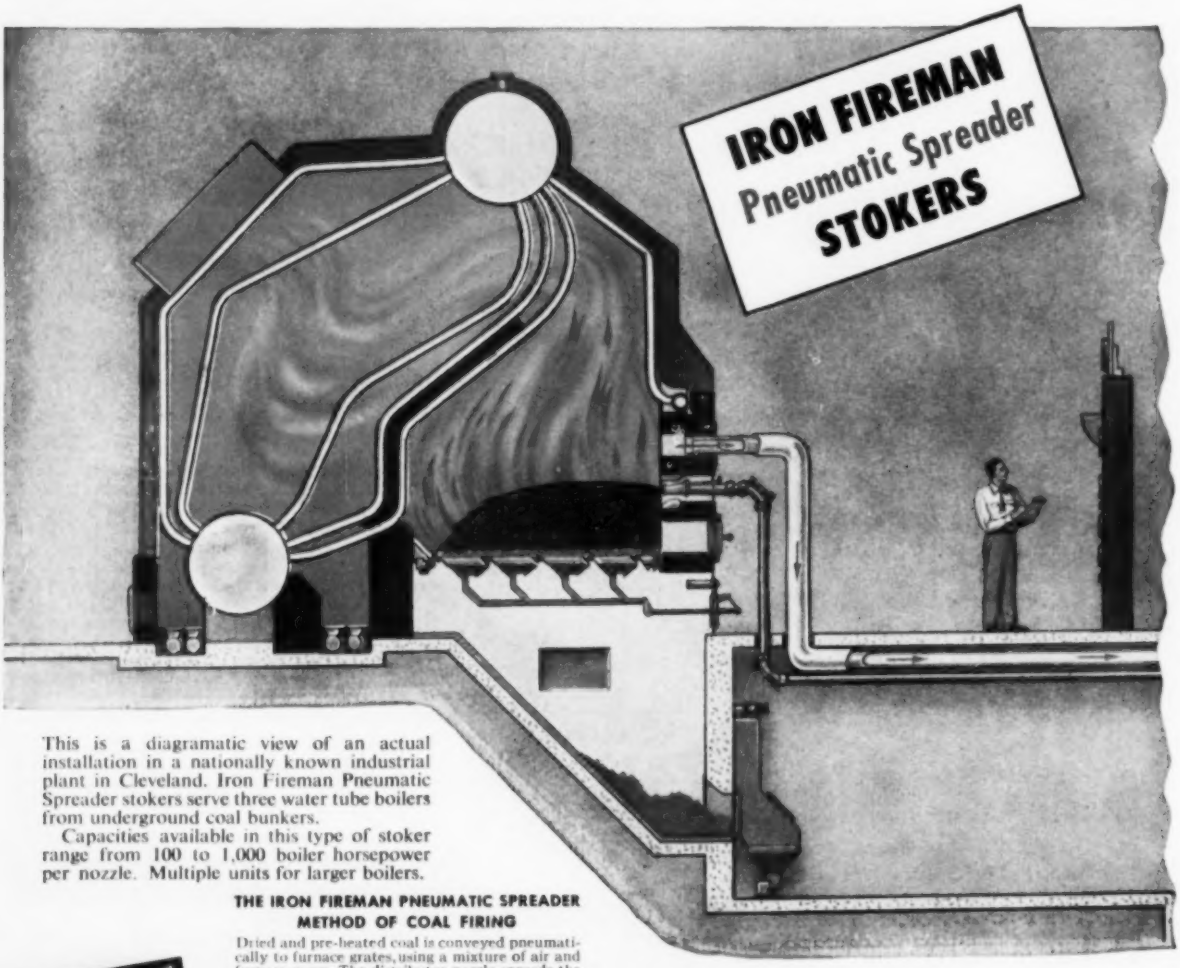
Iron Fireman coal conveying system is an integral part of the stoker. It is extremely flexible in application, permitting coal storage bins to be located in almost any position relative to the boiler. Automatic coal feed from bin to boiler makes other handling equipment unnecessary.

2

Fires coal automatically. Firing rate is always adjusted to steam demand

The firing rate automatically adjusts itself to the boiler load, even with widely fluctuating steam demands. The coal feed rate is capable of infinite variation from low fire to high fire and is therefore ideally suited to modulating combustion control.

3



This is a diagramatic view of an actual installation in a nationally known industrial plant in Cleveland. Iron Fireman Pneumatic Spreader stokers serve three water tube boilers from underground coal bunkers.

Capacities available in this type of stoker range from 100 to 1,000 boiler horsepower per nozzle. Multiple units for larger boilers.

THE IRON FIREMAN PNEUMATIC SPREADER METHOD OF COAL FIRING

Dried and pre-heated coal is conveyed pneumatically to furnace grates, using a mixture of air and furnace gases. The distributor nozzle spreads the coal over the *entire* grate in a shallow, uniform fuel bed. Pre-heated fines burn in suspension, reducing cinder carry-over and greatly improving combustion efficiency and responsiveness as compared with stokers which do not pre-heat coal.

Send for this booklet. This 16 page booklet, illustrated in full color, contains a full explanation of the Iron Fireman Pneumatic Spreader method of coal firing. It is available upon request from your Iron Fireman dealer or you may write to the factory. Address Iron Fireman Mfg. Co., 3048 W. 106th St., Cleveland 11, Ohio.

OIL, GAS, COAL FIRING FOR

IRON

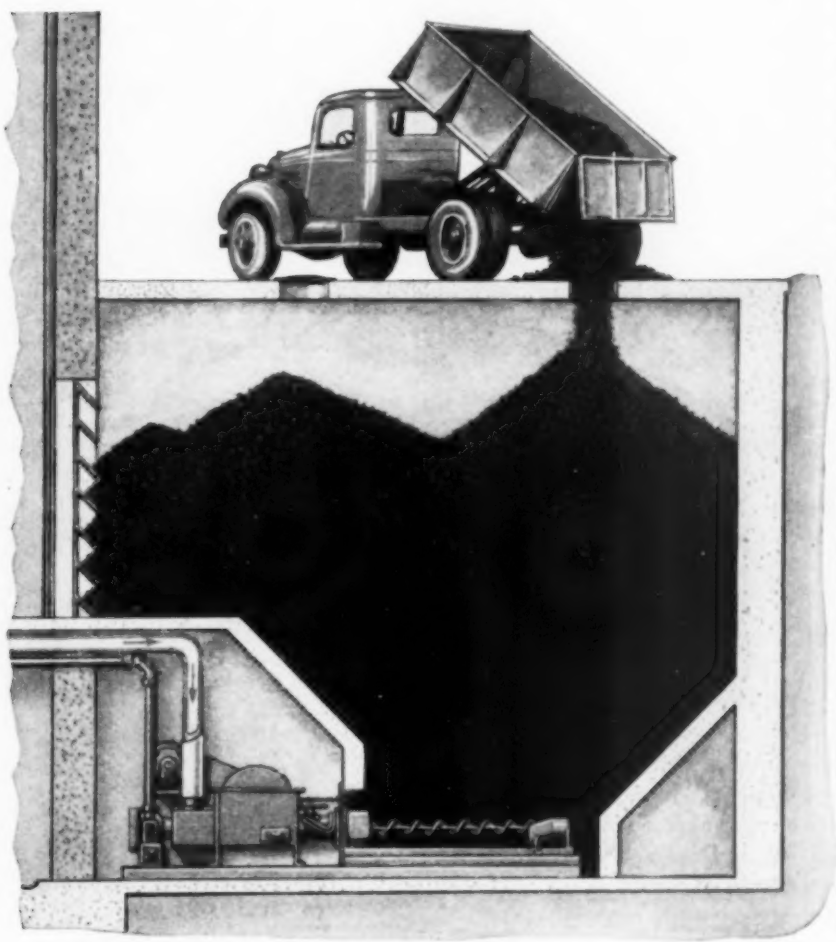
combined in ONE unit

Accurate fuel-air ratio at any firing rate, regardless of fuel bed condition

4 After efficient air-fuel ratios are determined for the grade of coal being used, these ratios are accurately maintained for all fuel bed conditions. This high degree of precision in automatic control of the fuel and air supply through the entire firing range is one of the important reasons behind Iron Fireman fuel economy.

Burns economy coals efficiently—all grades from ¼" slack to 2" top size

5 The Iron Fireman Pneumatic Spreader stoker has an outstanding advantage in the wide range of coals that can be used *efficiently*. Since this stoker is not limited to a few special grades, coal can be bought on a most-heat-per-dollar basis, using any coal that has greatest local availability or other advantages.



"We saved 33.9% on fuel alone with Iron Fireman Pneumatic Spreader firing,"

says Mr. H. A. Quinn, Manager Toledo Laundry, Toledo, Ohio

More steam for less money—plus the Iron Fireman Pneumatic Spreader stoker's ability to follow a fluctuating load and eliminate coal handling—has resulted in the installation of 3 units by the owners of this company. Mr. Quinn says, "Since installing Iron Fireman equipment our savings in fuel alone have been 33.9%. For our laundry processing equipment we have increased the temperature from 337°F. to 353°F. with improved quality of production."

Boiler room at Toledo Laundry.

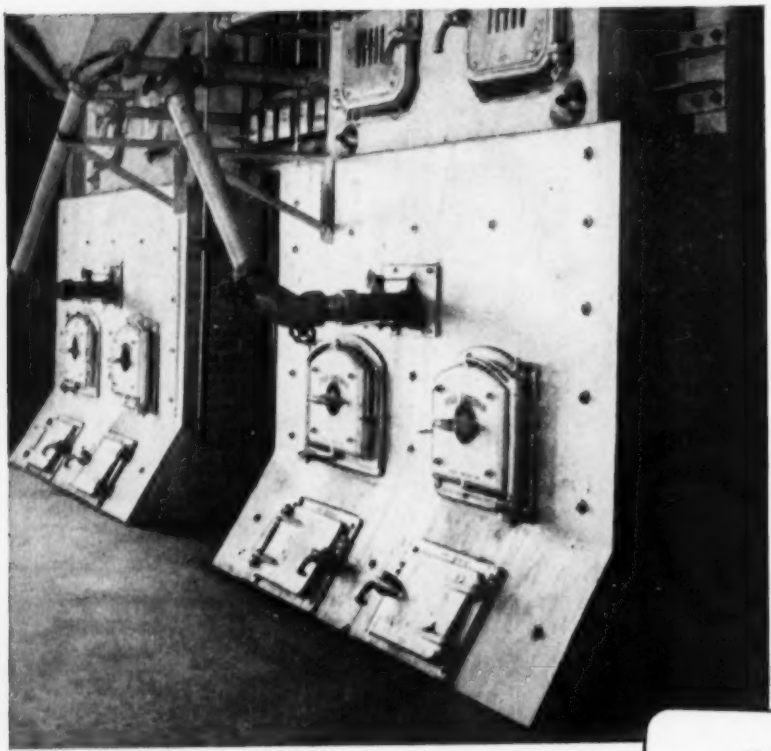
HEATING, PROCESSING, POWER

FIREMAN

THE IRON FIREMAN

HOW A SMALL PLANT SAVES BIG MONEY— BY BURNING COAL THE MODERN WAY!

"Modernizing our coal installation cut monthly fuel bills from $777 to $650... labor costs from $120 to only $40!"



says Mr. William C. Musch, Chief Engineer, Allen Memorial Hospital, Waterloo, Iowa.

Here's Allen Memorial Hospital's new steam plant. Boilers are fired by pneumatic spreader stokers. The plant now operates with ⅓ the manpower formerly needed. Compared to the old installation, the new equipment saves 18¢ on every thousand pounds of steam generated. The savings realized by this small plant will pay for the entire installation in 7½ years.

● Whether you plan to modernize your steam plant, or build a new one...whether you burn a lot of fuel, or a little...you can cut a *big* percentage from your operating costs by using up-to-date coal equipment.

A consulting engineer can show you how you can cut labor costs to a minimum with automatic coal- and ash-handling equipment...how you can get more steam for every dollar when you burn coal in a modern installation designed to meet your *specific* needs.

Of all fuels, only coal has ample reserves for the future. And to produce this coal, America has the world's most efficient coal industry. That means that coal users, unlike those committed to other fuels, get the advantages of dependable supply and relatively more stable prices—now and for the future!

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U. S. A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

The first line of reducers is still the foremost line

T F

Old timers will recall the day—more than 20 years ago—when Taylor Forge announced the first comprehensive line of butt-welding fittings.

Before the WeldELL line was introduced, the only available welding fittings were elbows. But in the WeldELL line came all the fittings needed to do a complete and workmanlike job of pipe welding . . . the tees, reducers, caps, stub ends, and welding flanges.

To produce all of these types of fittings in seamless forged steel was a giant undertaking—and still is. A good example of this is the line of reducers. Today there are 175 reductions in standard weight reducers alone—and this can be multiplied by all the weights and materials in which Taylor Forge reducers are available.

The first line is still the foremost line—the engineered line, the full value line. For up-to-the-minute facts about the WeldELL line, see your Taylor Forge Distributor.

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS
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TYPICAL USERS

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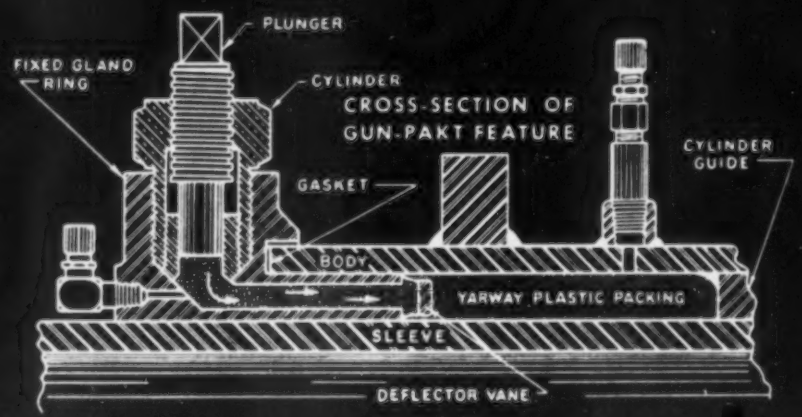
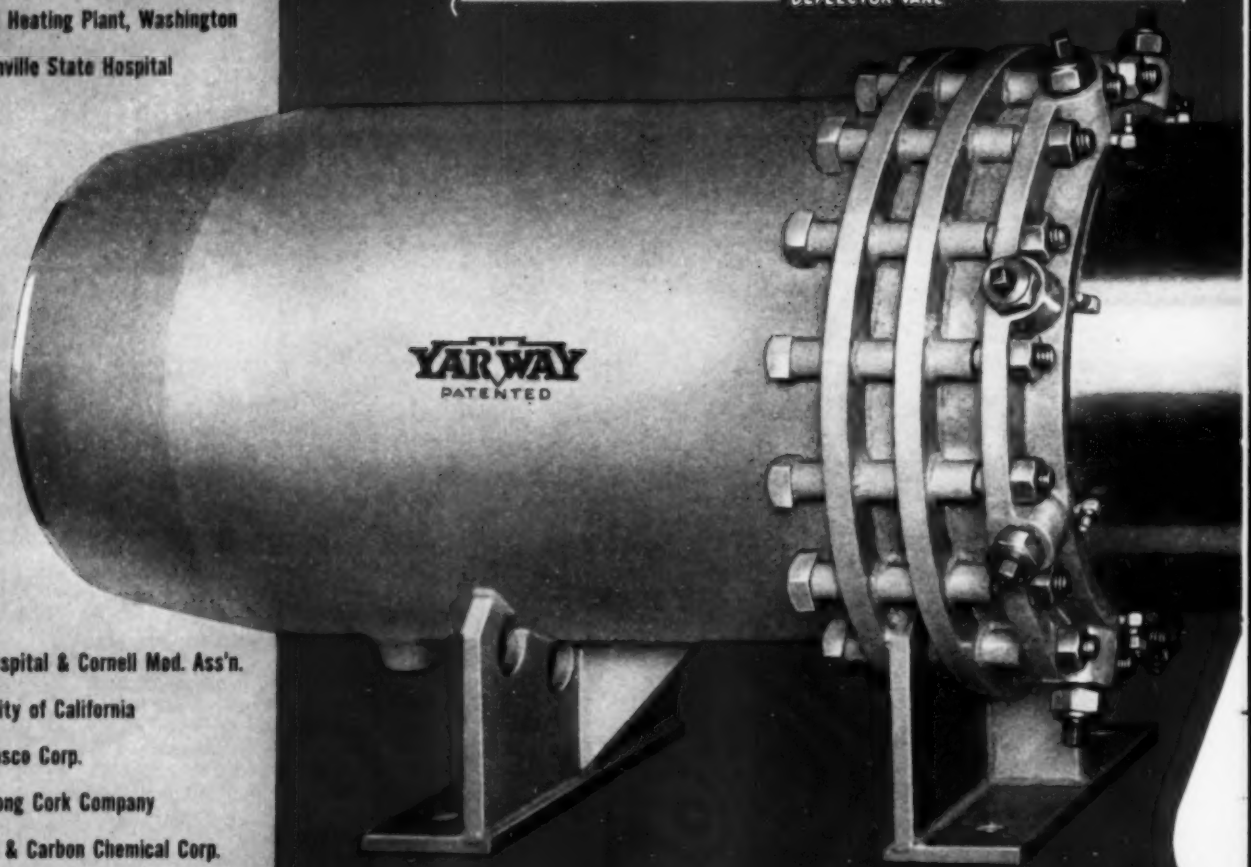
Jacksonville State Hospital

this expansion joint





N.Y. Hospital & Cornell Med. Ass'n.
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YARWAY

offers...

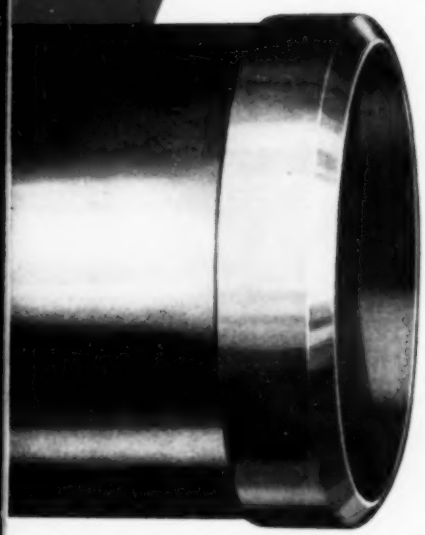
FREEDOM FROM SHUTDOWNS

What feature do you want most in an expansion joint . . . sure movement, simplified installation, ease of servicing, low cost, low upkeep?

Yes, they're all important. But when you're dealing with steam under pressure, *there's nothing more important than reliability—freedom from shutdowns.*

The high factor of safety in Yarway Gun-Pakt Expansion Joints prevents shutdown losses—eliminates accident hazards.

Gun-Pakt Joints are *rugged* joints, strong and dependable. They are *serviced under full steam pressure.* Packing is added simply by inserting a plug of Yarway plastic packing and turning a wrench . . . the joint's tight, the job done.



Yarway Single-end Gun-Pakt Expansion Joint, welding type. Double-end and flanged types also available.

FEWER JOINTS NEEDED

With Yarway Gun-Pakt Joints you need fewer joints per length of pipe line. Each sliding sleeve may have a traverse of either 4", 8" or 12" . . . maximum expansion being 24" for a double-end joint.

Gun-Pakt is more than just another expansion joint—it is a revolutionary idea in expansion joint engineering. Its success is shown by wide use in leading central heating stations, institutions and industrial plants.

Get the full Gun-Pakt story . . . get Yarway Bulletin EJ-1912. Write to . . .

YARNALL-WARING COMPANY

Home Office: 116 Mermaid Avenue, Philadelphia 18, Pa.

Southern Representative:

ROGER A. MARTIN, Bona Allen Building, Atlanta 3, Ga.

GUN-PAKT EXPANSION JOINT

GARLOCK BITAN Leather Cups, Packings and Gaskets

GARLOCK CHEVRON Hydraulic Packings

GARLOCK GUARDIAN Asbestos-metallic Gasket

GARLOCK KLOZURE Oil and Grease Seals for Bearings

GARLOCK LATTICE-BRAID Rod and Shaft Packings

BITAN*
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GUARDIAN*
KLOZURE*
LATTICE-BRAID*

These familiar brand names are registered trade-marks belonging to The Garlock Packing Company. They are never to be used as generic terms to designate types of products and are properly used only to denote products manufactured by Garlock.

*Trade-Mark Reg. U.S. Pat. Off.

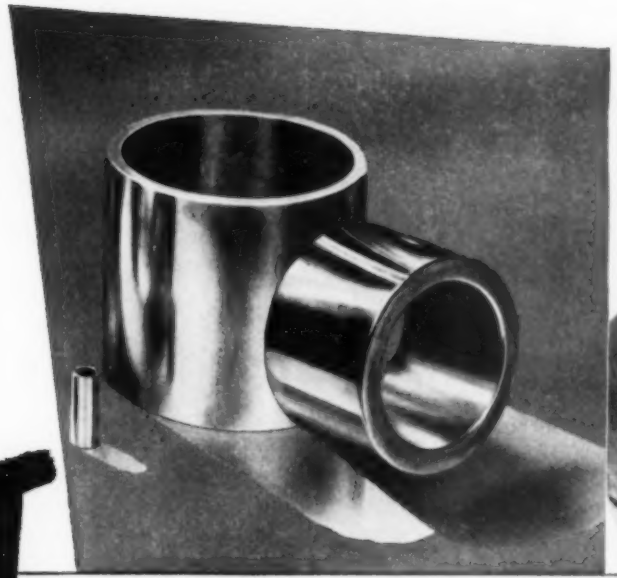
BITAN Leather Packings, CHEVRON Packings, GUARDIAN Gaskets, KLOZURE Oil Seals and LATTICE-BRAID Packings are all exclusive products of Garlock's own factories. So, wherever you see these trade-marks you can be sure that the products with which they are used are of proper design and are manufactured to the highest quality standards. They will give you long, dependable service.

Branch Offices in Principal Cities

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK®

PACKINGS, GASKETS, OIL SEALS, MECHANICAL SEALS, RUBBER EXPANSION JOINTS



They ARE LOCALLY AVAILABLE!

Bunting Standard Stock Bearings

The bronze bearings you need are as readily available as the Bunting catalog in your desk drawer. It gives all dimensions of hundreds of sizes of Bunting Standard Stock Bronze Bearings. Completely machined and finished, they meet every familiar requirement in production and maintenance of industrial machinery. Your local Bunting distributor carries comprehensive stocks at all times. Bunting factory branches in all industrial centers give strong and constant support to distributors.

The Bunting Distributor

Your Bunting Distributor is an industrial distributor or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. If he is the leading distributor, he almost certainly is the Bunting Distributor. He carries in stock, for your money saving convenience, completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars in a complete range of sizes meeting all your usual production and maintenance needs. Ask him for catalog.

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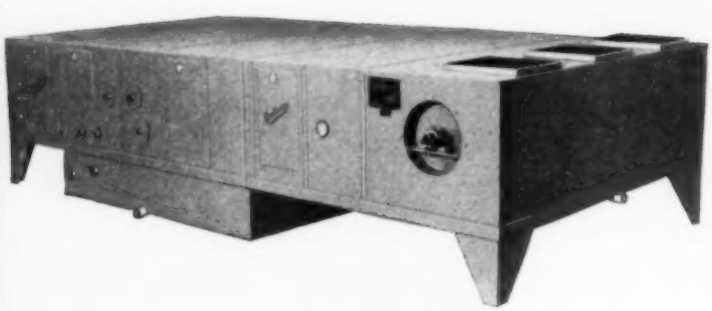
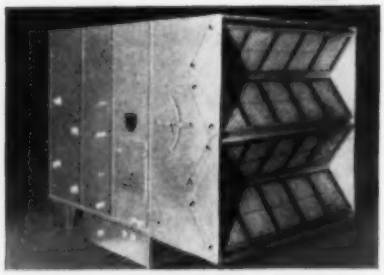
THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

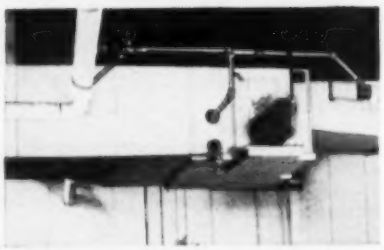
easy to install

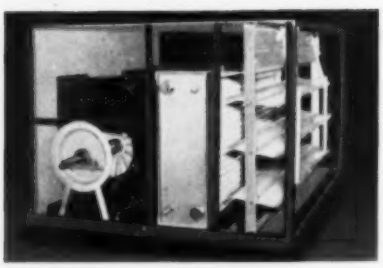
easy to live with



"Buffalo" "PC" AIR CONDITIONING CABINETS







Accurate testing assures rated performance of "Buffalo" Fans.

When you air condition, you want three things—as inexpensive a job as will do, equipment that installs economically—and most important—equipment that gives satisfaction over a long period.

Cost-wise, the central cabinet is the least expensive part of your system; considering compresser, duct-work and building modifications.

Satisfaction-wise, it's the most important!

If the fans are over rated, or inefficient, you'll suffer. If the coils are inefficient or untrustworthy, you'll have poor air conditioning.

Why not be sure that on this lowest-cost part of your system, you get the best?

"Buffalo" "PC" Air Conditioning Cabinets, to heat, cool, humidify or dehumidify, or any combination of these functions, have been in use for more than twenty years. They are sectionalized, to pass thru standard building openings, and assemble easily on location. They have husky, quiet, mixed flow fans mounted on large, vibrationless hollow shafts. They have Aerofin coils, by far the best obtainable. They have sturdy, outside-the-housing bearings, for convenient lubrication even after cabinet insulation. In short, they are built according to the "Q" Factor* which makes them your best buy!

"Buffalo" Engineering Sales Representatives in principal cities are anxious to serve you. Let them give you full details—no obligation.

***—The "Q" Factor—The built-in Quality which provides trouble-free satisfaction and long life.*

DIAMOND JUBILEE 75TH ANNIVERSARY

"Buffalo" FIRST FOR FANS

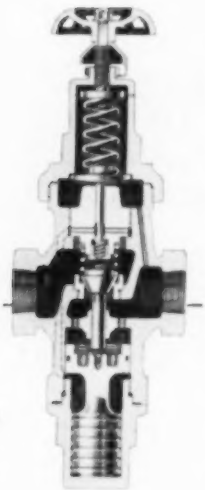
BUFFALO FORGE COMPANY

530 BROADWAY BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

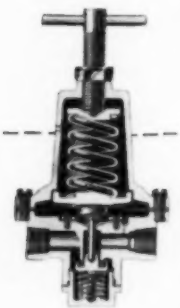
Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

VENTILATING	PRESSURE BLOWING	COOLING	HEATING	FORCED DRAFT
	AIR CLEANING	AIR TEMPERING	INDUCED DRAFT	EXHAUSTING



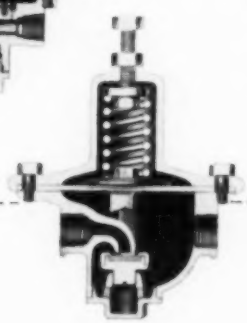
Masoneilan No. 11 Reducing Valve for Steam

Pilot operation assures fast response, accurate control. Superfinished parts eliminate sticking and corrosion. Stainless steel integral pilot, hardened main valve, chrome-nickel steel seat ring provide long life. Maintenance, with valve in the line, consists of little more than keeping parts clean. Available in bronze, iron or steel.



Masoneilan No. 71 Reducing Valve for Air

Dependable, high capacity, compact and rugged reducing valve provides stable control. Requires little maintenance during long life. Forged brass bodies — sizes ¼", ⅜", ½".



Masoneilan No. 227 Reducing Valve for Water

Holds water pressure where you want it. Stabilizes control without cutting down flow. Has tight shutoff. Requires minimum attention. Bronze bodies — sizes ¼"-2".

SOLUTION TO A SHAKY PRESSURE PROBLEM

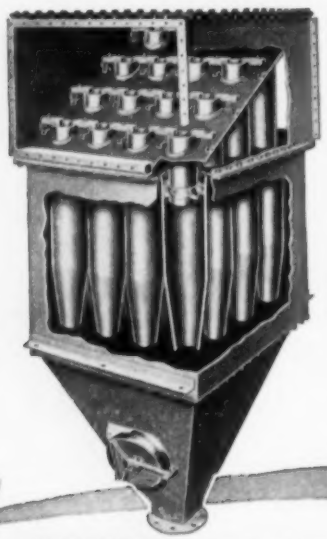
MASONEILAN REGULATORS

Keep Pressure under Control

ALL HIGH Quality Coefficient PRODUCTS

Stocked by or available through your reliable Industrial Distributor. Or write **Mason-Neilan Regulator Co., 1206 Adams Street, Boston 24, Massachusetts**

Before you buy *any* equipment for recovering fly ash . . .



COMPARE ALL OTHERS against MULTICLONE'S Multiple Advantages

Because the advantages of MULTICLONE are so clear-cut, so vitally important, so far-reaching in the savings they make, we urge you to make a factual unbiased comparison of MULTICLONE fly ash collection equipment against *any other* in the mechanical recovery field. Only by making such a comparison can you fully appreciate the major savings and greater performance you get by installing MULTICLONE Collectors!

COMPARE Recovery Efficiency!

It is a recognized fact that the separating efficiency of a cyclonic tube *increases* as the tube diameter *decreases* because smaller tubes generate greater centrifugal forces. The patented vane in the MULTICLONE makes the use of small tubes *practical* without complicated manifolding and permits compacting many small tubes into one simple, highly efficient unit. MULTICLONE's higher centrifugal forces throw out not only the large, medium and small particles, but also an unusually high percentage of the *extremely small* particles of 10 microns and less. Result—*more complete recovery of all suspended particles from the gas stream!*

COMPARE Space-Saving Compactness!

Plant space costs money—particularly at today's high construction costs. Because the MULTICLONE is more compact, size for size, it makes *really important* savings in space and plant costs. Note in the chart how the MULTICLONE requires substantially less space—*both in floor space and cubic space*—than any other unit of comparable capacity and performance. *This means vital savings in construction costs!*

Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.8
Collector B	5.9	3.2
Collector C	6.8	3.9

COMPARE Dollar-Saving Adaptability!

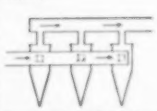
Savings in space is just one of many ways MULTICLONE reduces installation costs. Because the shape of the unit can be readily varied (long and narrow, short and wide, or square) to fit available spaces, the MULTICLONE can often be tucked into odd corners and waste areas too restricted for other equipment.

Moreover, inlet-outlet ducts can be varied—side-inlet side-outlet, or side-inlet top-outlet—to meet low headroom or restricted side clearance requirements . . . and the single-inlet single-outlet duct design permits greater flexibility and simpler installation. *These all add up to vital savings in installation costs!*

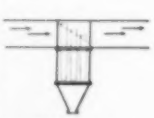
Side inlet, Side outlet ***Side inlet, Top outlet***

COMPARE All-Around Simplicity!

The MULTICLONE is simple and inexpensive to maintain because there are no highspeed moving parts to repair or replace . . . no pads or filters to clean or renew . . . nothing to choke the gas flow or increase draft losses as suspended materials are recovered. In addition, the square, flat-sided shape of the MULTICLONE and its straight inlet and outlet ducts are far simpler to install and insulate. And since the recovered material from an entire bank of tubes is collected in a *single* hopper, it is much easier to service and maintain than the multiple hoppers of conventional cyclone units. *Here again, the* MULTICLONE *saves in many ways—all of them important!*



Conventional Cyclone



Multiclone

Whether your recovery installation is in a new structure or for modernizing present equipment, you will be far ahead by installing MULTICLONE Collectors. Our experienced engineers will gladly make helpful suggestions for simplifying your recovery problems. A letter, wire or call to our nearest office places this assistance at your service without obligation.

Send for Helpful Literature! This factual MULTICLONE literature explains the basic principles of cyclonic dust recovery and gives technical data helpful to anyone contemplating a dust or fly ash recovery installation. Write today for your free copy!

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1052 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA

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LADISH

Controlled Quality

PIPE FITTINGS

maximum service assured by metallurgical soundness

Sound metallurgy . . . the result of unsurpassed facilities and advanced laboratory controls . . . provides the maximum of dependability in Ladish Controlled Quality fittings. Every phase of metal quality . . . composition, structure and physical properties . . . is continuously safeguarded — and certified proof of metallurgical integrity is available to users of Ladish fittings.

Ⓛ

TO MARK PROGRESS

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF...ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN
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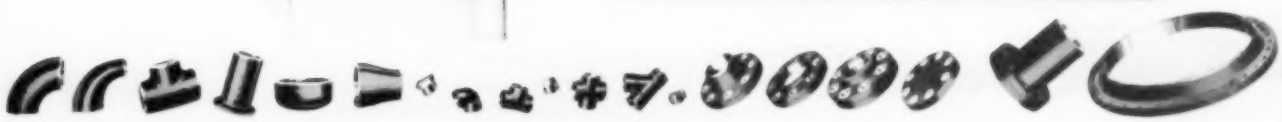
District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago • St. Paul
St. Louis • Atlanta • Houston • Tulsa • Los Angeles • San Francisco • Havana • Mexico City • Brantford, Ont.



150-ft. spud barge *A. H. Stall*, with its Cooper-Bessemer-powered Bucyrus-Erie 200-W dragline, is owned and operated by J. Ray McDermott & Co., Harvey, La., and has been in highly successful use on various excavating jobs since January 1951. On this operation the unit is swinging a 6-yd. clamshell bucket on a specially extended 140-ft. boom.

THIS big barge-mounted Bucyrus-Erie dragline, Cooper-Bessemer-powered, is working month after month, 24 hours a day in the swamplands below New Orleans. Here, with this machine, J. Ray McDermott & Company is moving almost 3 million yards of muck to build an endless levee for two huge fresh water reservoirs. In turn, these reservoirs will store millions of gallons of fresh Mississippi water for the mining of sulphur in a vast new dome beneath the marshes.

The levee will be 6 miles long, 100 feet wide at the base, and 12 feet high with a 10-ft. crown — an 8- or 9-month excavating job! And on a big, hard-to-reach job like this you soon learn the *extra* value of diesel power you can count on for continuous, trouble-free performance.

Cooper-Bessemer diesels are designed for all kinds of service. They're your best bet when it comes to heavy-duty power.

The Cooper-Bessemer Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle Tulsa Shreveport St. Louis Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of Canada, Ltd., Halifax, Nova Scotia Gloucester, Mass. New Orleans, La.

From barge to bunker...

One of two Link-Belt Speeder Cranes unloads barges. The Link-Belt system then transfers coal to storage bunkers or to ground storage.

LINK-BELT cuts coal handling costs

Recent addition at this station included twelve 24-in. Link-Belt belt conveyors. En route to bunkers coal is crushed and weighed.

Two of six Link-Belt belt-propelled trippers empty coal into storage bunkers. Link-Belt Series 100 Idlers are used throughout.

Eastern power plant utilizes LINK-BELT's proved engineering and equipment for top efficiency

WHEN this power plant wanted to increase its coal handling capacity to 325 tph, they chose Link-Belt. With eight years' successful operation of an earlier Link-Belt system, they knew they could expect top efficiency.

Now, from the time two Link-Belt Speeder pedestal-mounted cranes unload river barges . . . until six belt-propelled trippers discharge into storage bunkers—handling is completely mechanical. By integrating the old and new systems, complete flexibility is achieved.

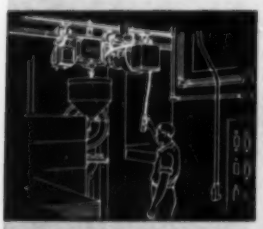
Whether your coal requirements are large or small, you, too, will find it pays to rely on Link-Belt. There's a 44-page book—No. 2410—that shows scores of typical modern power plant layouts. Ask the Link-Belt office near you for a copy.

LINK-BELT

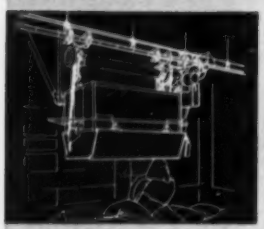
COAL HANDLING EQUIPMENT

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

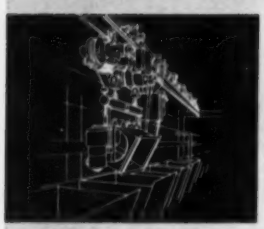
12.211



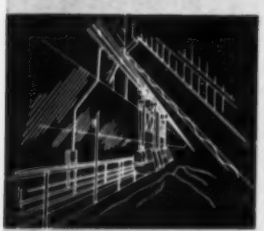
Dispatch to multiple stations



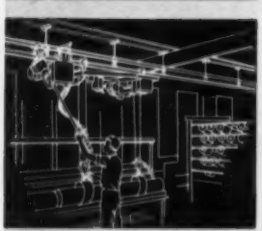
Delivery to fixed stations



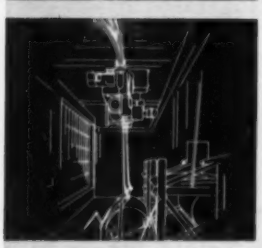
Delivery to multiple stations



Delivery to movable stations

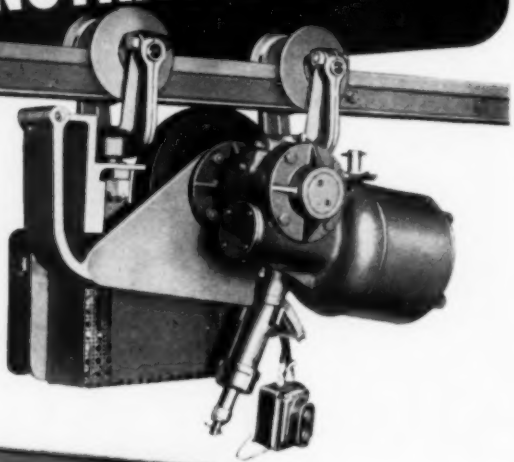


Selective dispatch between multiple stations

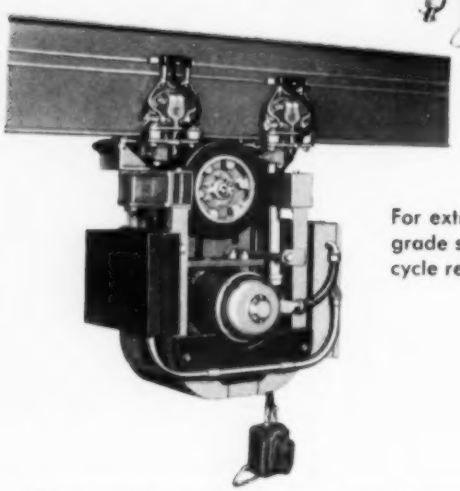


Load and delivery to multiple stations

2 New AMERICAN MONORAIL MONOTRACTORS



For low cost propulsion of a 1-ton hoist or carrier.



For extremely heavy-grade speed or duty-cycle requirements.

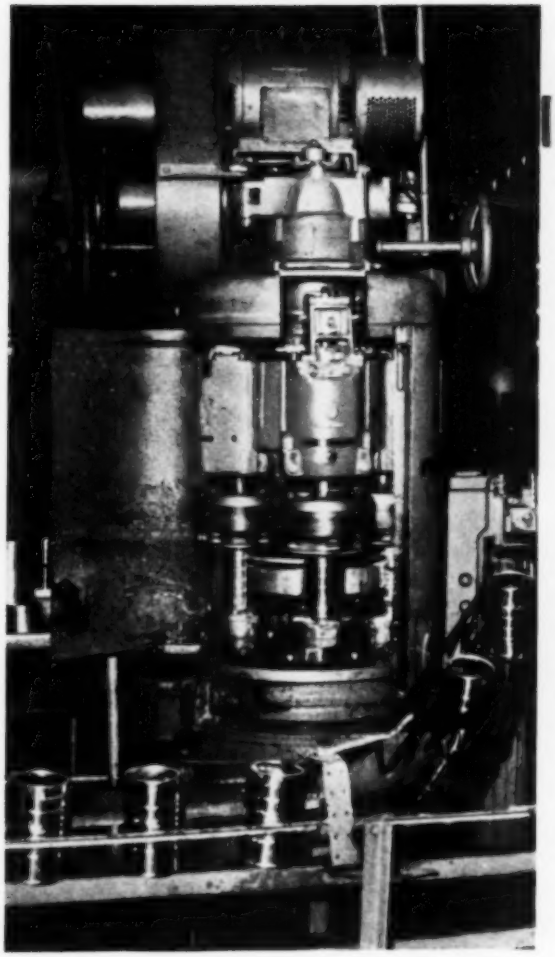
To propel heavy loads or automatic carriers on overhead monorail systems, here are two new American MonoRail MonoTractors. Through the application of simple electrical and mechanical devices, American MonoTractor Units perform a wide variety of automatic handling operations.

While unique in many features, such systems are built mainly from standard units. MonoTractors can be applied to carriers operating on any smooth bottom track. An American MonoRail Engineer is available for consultation in every important industrial area.

SEND FOR BULLETIN AD-1

THE AMERICAN MONORAIL COMPANY

13105 **ATHENS AVENUE** **CLEVELAND 7, OHIO**



"Litholine has cut our Bearing Replacements 33%"

. . . says W. F. Davis,

Supt. of Maintenance, Bordo Products Co., Winter Haven, Florida

Reducing bearing replacements by 33% is prime proof of LITHOLINE'S® superiority. But Mr. Davis doesn't stop there in his enthusiasm for this top quality grease. He says: "As citrus canners, we expect a lot from our lubricants. On our closing machines, LITHOLINE must maintain its adhesive qualities under a continuous flow of steam and 218° heat. It handles the job – and *very well*. Multi-Purpose LITHOLINE has replaced 2 other greases, reduced applications from 3 to 2 a day and cut grease consumption by 50%! That's why we've been using Sinclair LITHOLINE exclusively for the past 2 years."

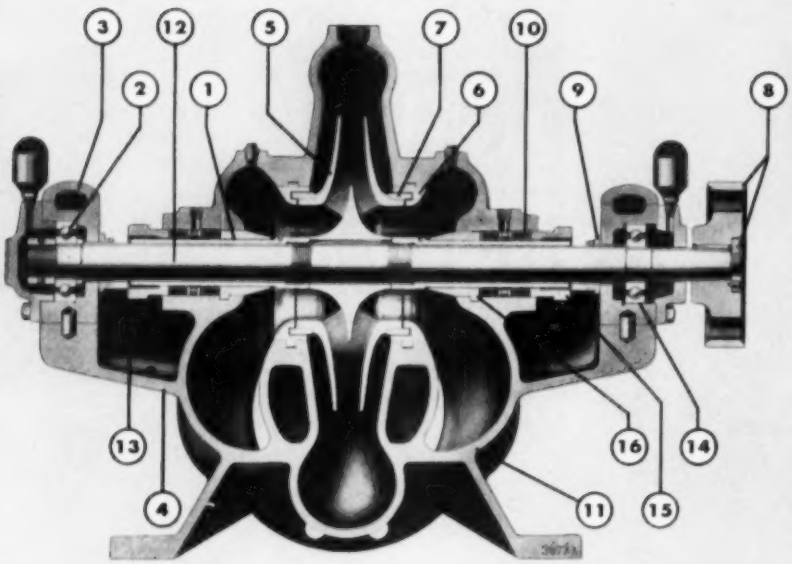
LITHOLINE could help in your operations, too. Why not call your nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LITHOLINE

for longer bearing life

DE LAVAL
SINGLE STAGE
CENTRIFUGAL PUMPS

for dependable industrial service



Labyrinth wearing rings minimize leakage...maintain high efficiencies

Labyrinth rings used in these De Laval pumps retard flow of water through labyrinth passage.

Flat rings showing relatively unimpeded flow of water.

(1) **Shaft Sleeves** are screwed on, to abut the impeller and make a water-tight joint. Sleeve expands freely and independently of shaft when temperatures change. There is no tendency to buckle.

(2) **Thrust Bearing** locates rotor axially.

(3) **Bearing Caps** easily removable for maintenance.

(4) **Bearing Brackets** scraped to lining bars for perfect alignment.

(5) **Impeller** hydraulically balanced, finished on all surfaces.

(6) **Labyrinth Wearing Rings** held accurately in machined grooves in both case and cover.

(7) **Impeller Wearing Rings** threaded on impeller, opposite to rotation.

(8) **Flexible Coupling** ground on all exposed surfaces and statically balanced, complete coupling supplied, pump half mounted on taper so that it can be easily removed. Check nut locks coupling on taper.

(9) **Deflector** keeps water out of bearing.

(10) **Stuffing Boxes** extra deep; lantern rings for water sealing.

(11) **Pump Case** horizontally split; machined to limit gages.

(12) **Steel Shaft** ground to limit gages.

(13) **Drip Boxes** large; provided with drain openings.

(14) **Radial Bearing** free to move axially, thus avoiding temperature strains.

(15) **Glands** split horizontally.

(16) **Protecting Bushings** renewable.

You can count on the performance of the De Laval Single Stage Centrifugal Pumps because they are precision-made to high manufacturing standards and incorporate the many quality design features shown in the cross-section.

They operate at high or low speeds, at high or low heads...with maximum efficiency.

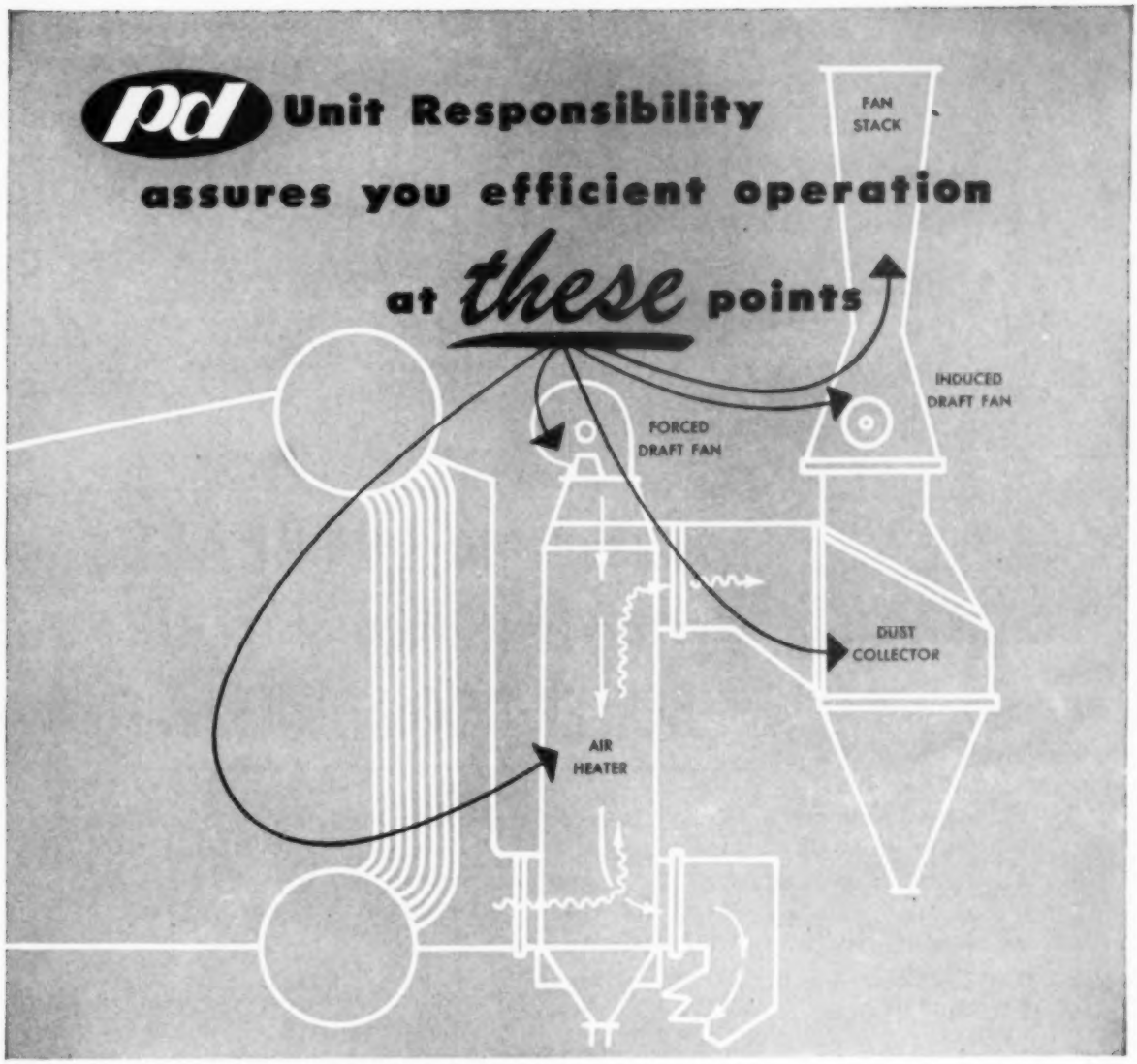
For example, De Laval G, I and K Single Stage Double Suction Pumps have a capacity range of 175 gpm to 6,000 gpm, and heads to 300 feet. They are available in sizes ranging from 4" suction and 3" discharge to 14" suction and 12" discharge. Write for Bulletin 1002.

DeLaval also furnishes larger centrifugals for capacities up to 70,000 gpm. Bulletin 83-29R sent on request.

DE LAVAL *Centrifugal Pumps*

DE LAVAL STEAM TURBINE COMPANY
817 Nottingham Way, Trenton 2, New Jersey

DL 198



Unit Responsibility, for important components of plant design by the Prat-Daniel Corporation, relieves your engineers of necessary problems of coordination that often arise when equipment is purchased from several sources.

Prat-Daniel, designing and manufacturing engineers of *Forced Draft Fans, Air Preheaters, Tubular Dust Collectors, Induced Draft Fans* and *Fan Stacks*, make possible this coordination of components by a single company with over a quarter of a century experience in the power field.

This service is offered through The Thermix Corporation, project engineers for Prat-Daniel. Specialists in this field, they can assure you a completely integrated system. Why not contact Thermix today. Ask for the new P-D Bulletin 4P201.

Project Engineers for Power Plant Division

THE THERMIX CORPORATION

GREENWICH, CONN.

(Offices in 38 Principal Cities)

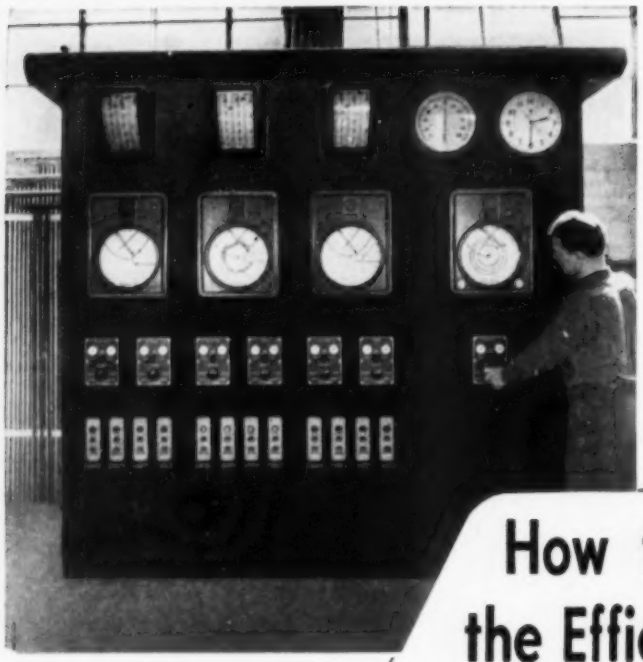
Canadian Affiliates: T. C. CHOWN, LTD., Montreal 25, Quebec; Toronto 5, Ontario

Designers and Manufacturers

PRAT-DANIEL CORPORATION

SOUTH NORWALK, CONN.

POWER DIVISION: Tubular Dust Collectors, Forced Draft Fans, Air Preheaters, Induced Draft Fans, Fan Stacks.



These Bailey Boiler Controls at the Chicago Pneumatic Tool Company's new plant in Utica, N. Y. insure efficient operation of three 25,000 lb per hour, 100 psi, spreader stoker-fired boilers

How to INCREASE the Efficiency of YOUR BOILER-ROOM DOLLAR

Before you get steam you've got to spend dollars—so dollars are a form of energy.

And if your boiler-room dollars are invested in equipment that isn't working efficiently, economically, your "investment" is poor.

That's where co-ordinated controls by Bailey can help. Here's why they'll increase your "boiler-room investment efficiency":

1. **Complete Range of Equipment—fully co-ordinated.** You need never worry that a Bailey Engineer's recommendation is slanted in favor of a particular type of equipment, just because he has a limited line to sell—or that Bailey will pass the buck for efficient control; we offer *complete* boiler control systems.

2. **Engineering Service—backed by experience.** No other manufacturer of instruments and controls can offer as broad an experience, based on successful installations involving all types of combustion, flow measurement and automatic control.

3. **Direct Sales-Service — conveniently located near you.** Bailey Meter Company's sales-service engineers are located in more industrial centers than those of any other manufacturer of boiler control systems; you get prompt, experienced service with a minimum of travel time and expense.

•

For better "boiler-room investment" efficiency—for more power per fuel dollar, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey engineer to arrange a visit to a nearby Bailey installation. We're proud to stand on our record: "More power to you!"

A-111-C

BAILEY METERS

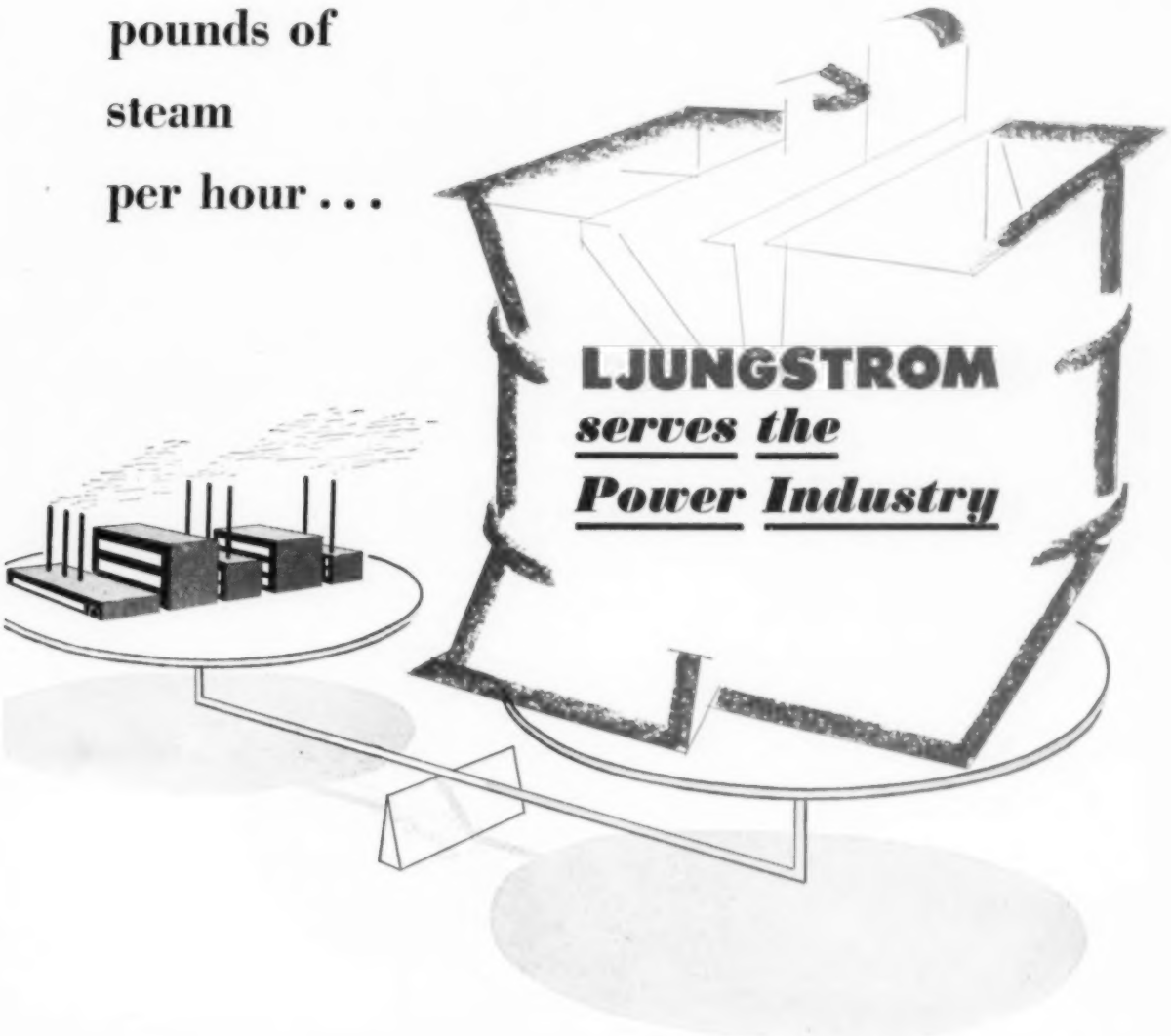
BAILEY METER COMPANY

1028 IVANHOE ROAD
CLEVELAND 10, OHIO

Controls for Steam Plants
COMBUSTION · FEED WATER
TEMPERATURE · PRESSURE
LIQUID LEVEL · FEED PUMPS

347,000,000

pounds of steam per hour . . .



In the post-war rush to expand power generating facilities, utilities have not lost sight of the need for *operating economy*. Increasingly over these years, the fuel-saving, performance-improving potentials of the Ljungstrom Air Preheater have been realized – until today, nearly two out of every three power boilers are ordered with the specification "Ljungstom Air Preheater."

Since 1946 alone, in fact, more than 347,000,000 pounds per hour of steam capacity – installed or on order – have been designed for Ljungstrom.

This record speaks for itself. It proves that the Ljungstrom Air Preheater is, indeed, *the most economical heating surface in the modern boiler.*

The AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

WARREN PUMPS

keep their heads!

. . . . . in other words, *maintained efficiency* has always been, and will continue to be, a fundamental virtue of all Warren Pumps. *Original* efficiencies in a pump can be very misleading and a source of disappointment in its long range efficient life expectancy.

The three most important factors affecting maintained efficiency are hydraulic design, leakage losses and friction losses. The generous acceptance of Warren Pumps for well over half a century is convincing evidence that Warren has the engineering ability, skilled pump mechanics, and plant facilities to handle all of these important factors to the definite advantage of their customers, from the angle of longe-range efficiency, minimum wear, and low power costs.

"THEY KEEP THEIR HEADS"

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS

G-1

WARREN QUIMBY PUMPS

WARREN PUMPS

CENTRIFUGAL • RECIPROCATING • ROTARY

A Typical Report of a GRAVER DEAERATING HEATER

GUARANTEE: *Exceeded*

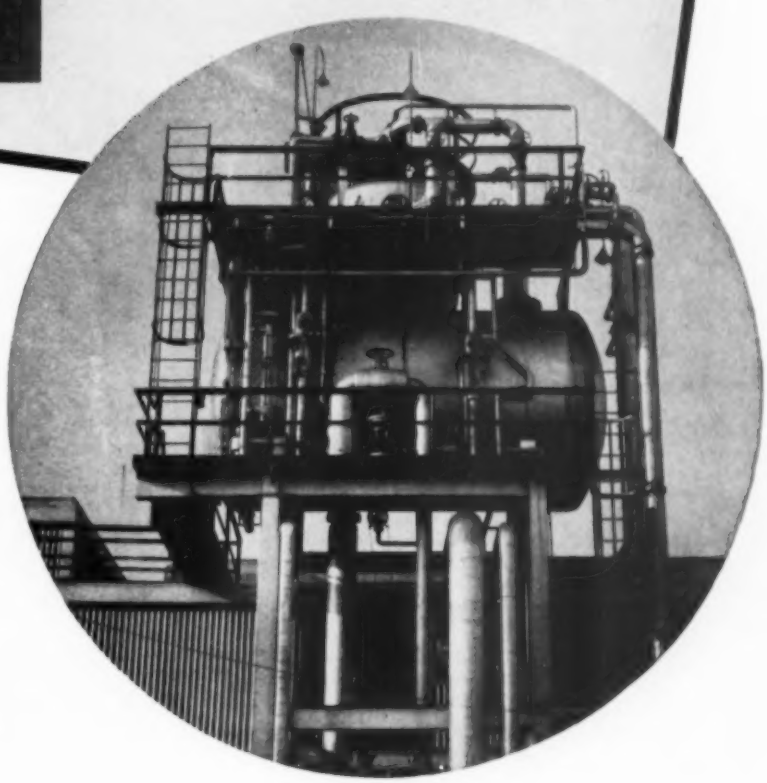
SERVICE: *Excellent*

The installation: A prominent Eastern petroleum refining company.

The unit: Graver Spray-Type Deaerating Heater delivering 450,000 pounds of feedwater per hour to 650 psig waste heat boilers.

The requirements: To remove up to 100 ppm CO_2 and 12 ppm O_2 under all load conditions with water at 60°F. Guarantee - 0.005 ml/l of O_2.

The performance: Average of 0.0047 ml/l of O_2 certified by an independent consulting engineering laboratory, and with completely trouble-free service.



The important point about this report is that it is *typical* of Graver Deaerating Heater performance, even under difficult load variations or water conditions.

Graver Heaters are available in a *complete range* of sizes in spray, tray, or combination spray-tray types. Graver Heaters are individually tailored to your exact plant requirements . . . that's one of the reasons why Graver's guarantee and service can be depended upon.

Write for free copy of "Trends in Application of Deaerating Heaters for Treatment of Boiler Feedwater".

GRAVER WATER CONDITIONING CO.

GRAVER

Division of Graver Tank & Mfg. Co., Inc.

DEPT. SPI-H, 216 WEST 14TH STREET, NEW YORK 11, N. Y.

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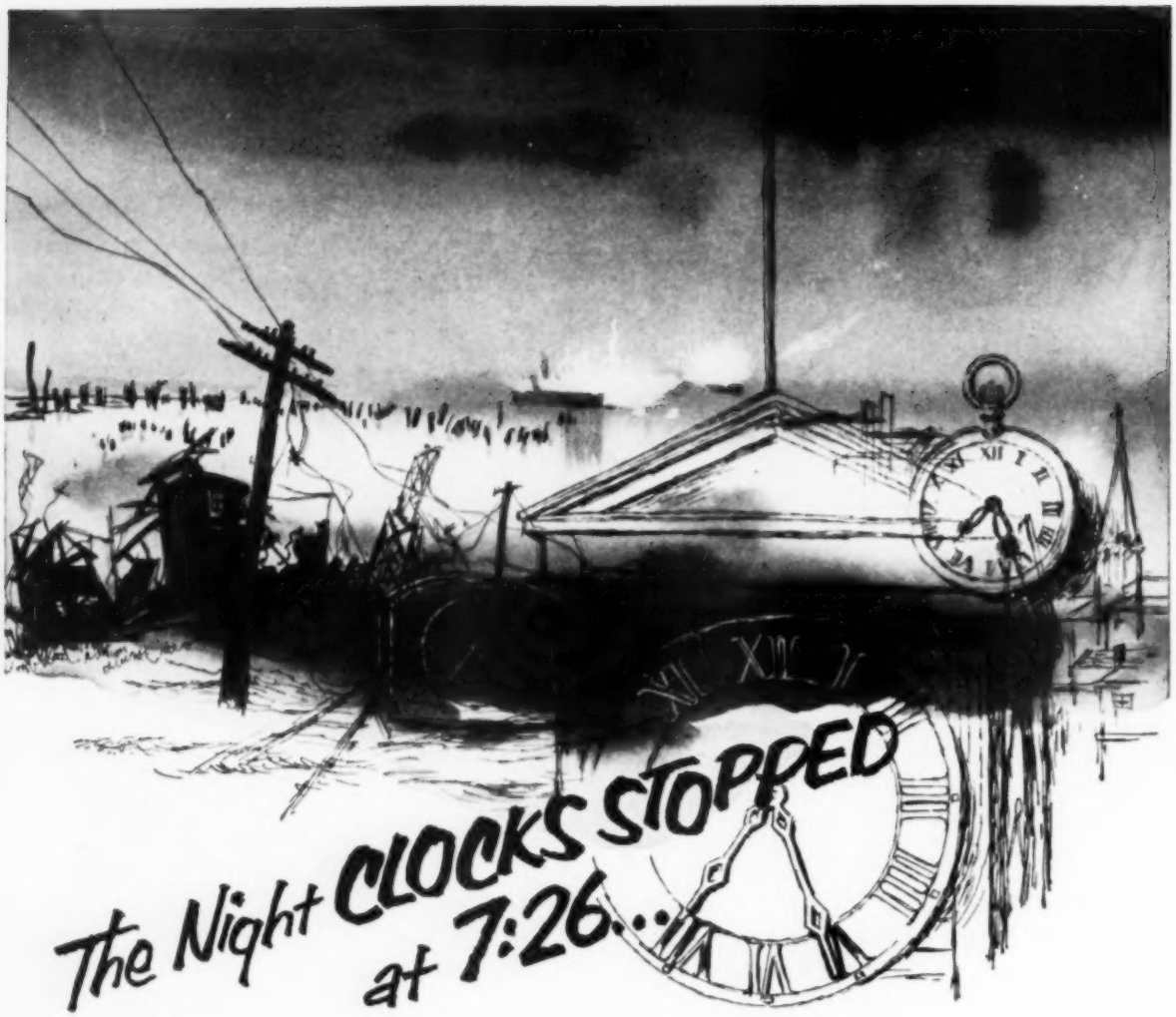
GW481



Some 9,500 people were in South Amboy, N. J., that drizzly evening in 1950. At the waterfront, longshoremen were transferring the last of 12 freight cars of ammunition to lighters that would carry it to a waiting vessel in Raritan Bay.

But the City Hall clock never got to 7:27—and the freighter's deadly cargo never got loaded. Explosions shattered windows over a radius of 12 miles; and hundreds of people looked at their arms and legs and saw that flying daggers of glass had stabbed them.

At dawn, 312 of the injured had been counted.

* * *

Such disasters have happened many times before in America. They could happen again. And *if* they do—and *when* they do—there must be blood plasma on hand to take care of the injured. For blood saves lives!

But blood cannot be mined or manufactured. It must come from the veins of healthy men and women. Men and women who feel concern for a suffering neighbor. So give blood—now!

Whether your blood goes for Civil Defense needs, to a combat area, or to a local hospital—this priceless, painless gift will some day save an American life!

Give Blood Now

CALL YOUR RED CROSS TODAY!

National Blood Program

Business Executives!

✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

a good "family" to know for

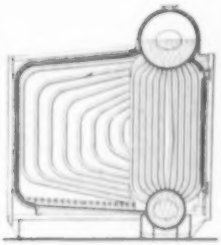
LOW-COST STEAM

B&W Integral-Furnace Boilers

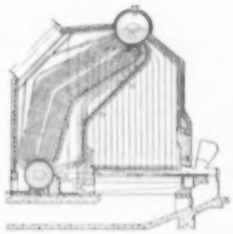
For Steam Requirements From 2900 to 350,000 Lb/Hr

Long established as the leading choice of industrial and other users for an ever-growing variety of applications, B&W Integral-Furnace Boilers of every type and rating, and covering an unusual range of steam requirements, are *service-proved . . . your proof* of lower steam costs combined with higher service life. Total capacity of B&W "F" Boilers—in service and on order—is well over 200,000,000 lb per hr. This sweeping acceptance by users is your strongest possible assurance of B&W reliability and economy.

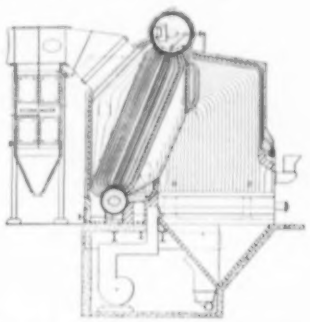
Before planning your next installation, check with B&W for the Integral-Furnace Boiler best suited to your needs. These units are available for all standard fuels, and B&W can also meet your requirements should conditions demand the use of special fuels. Write for illustrated bulletins covering the B&W "F" Boilers in greater detail. The Babcock & Wilcox Company, Boiler Division, 161 E. 42nd Street, New York 17, N. Y.



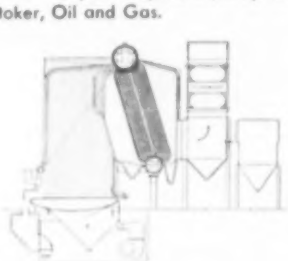
TYPE FM—2,900-28,000 lb/hr up to 250 psi. Oil and Gas Firing.



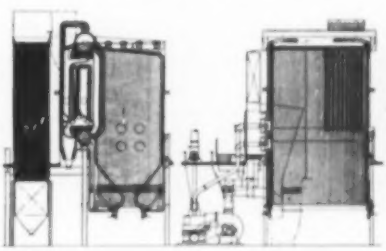
TYPE FF—8,000-50,000 lb/hr up to 600 psi. Stoker, Oil and Gas Firing.



TYPE FJ—30,000-70,000 lb/hr up to 800 psi. Stoker, Oil and Gas.



TYPE FL—60,000-150,000 lb/hr up to 1050 psi. Stoker, Oil and Gas Firing.



TYPE FH—50,000-350,000 lb/hr up to 1050 psi. Pulverized Coal, Oil and Gas Firing.

COST SAVING FEATURES

- Minimum floor space and headroom requirements.
- High fuel economy.
- Smokeless combustion.
- Adaptable to all fuels and firing methods.
- Economical fast steaming.
- Water-cooled furnace.
- Clean, dry steam at all ratings even with high boiler water concentrations.
- Quick response to wide and heavy load swing demands.
- Easy to inspect and clean.
- High availability with least attention.

BABCOCK & WILCOX

G-601

MIDGETS...or

MAMMOTHS!

CHAPMAN makes STEEL VALVES for every job

For high-pressure, high-temperature service (as well as sub-zero duty), Chapman makes steel valves in a range of series from 150 to 2500 lb . . . in gate, globe, angle and check types . . . in steels of many different analyses and with suitable trim to resist corrosion and erosion.

Chapman Steel Valves are accurately machined and finished, designed to ASA and API ratings, and may be furnished with flanged or welding ends. These valves can be equipped for any type of operation . . . hand, gearing, hydraulic cylinder or Chapman motor unit as shown in illustration. So for all standard and any special Steel Valves, check with Chapman *first*. Meanwhile, write for Catalog 20.

THE CHAPMAN VALVE MANUFACTURING COMPANY
INDIAN ORCHARD, MASSACHUSETTS

Timely Comments

Common Sense Maintenance

GOOD COMMON SENSE is the first characteristic of a high grade maintenance man. Technical training, personal experience, safety rules, and established procedures are all his tools, but when any of these fail to check with his own good judgment, he calls a halt until he can reconcile his own opinion with what the rule books and experts say.

Each repairman on each job carries large responsibility:

1. He is responsible for his own safety and the safety of his crew.

2. He is responsible for the safety of all others in the work area—operators, other repair crews, visitors, and the general public.

3. He is responsible for the safety of the equipment being repaired, and all other equipment in the area.

4. He is responsible for having necessary tools and supplies on the job.

5. He is responsible for the performance of his own men, and he must keep those to whom he reports informed on any of his actions that might involve others, or necessitate joint action or cooperation.

6. He is responsible for getting the repair done right and at minimum cost.

These responsibilities involve use of good judgment in regard to men, materials and equipment.

Many times a good maintenance man wishes he were wiser, better educated, and more experienced. But at the same time he realizes that to gain full knowledge of all the problems he must encounter would take more than one lifetime. So, he relies heavily on common sense. He must decide when to stop and check-up, and when to go ahead. He tries to avoid "blind action," by finding out the facts on new types of work. He respects the opinions of others, but he moves not until he is fully convinced.

Sometimes he is wrong, but nearly all of his errors are on the safe side. He may demand a too-strong sling, or spend a little too much on a work platform, and he may prove a little provoking in his thorough, conservative methods. But, if he is to stay in maintenance he commits very few costly errors.

And yet! In spite of all of the care he must exercise, his work demands quick action—production must go on. He appreciates a pat on the back for quick handling of an emergency job, but he is constantly aware of the dire results of serious error. He learns to weigh each problem. Where a slip-up might do little harm, he speeds ahead. But when the cards are down, and one little error might prove fatal, MR. MAINTENANCE is a very conservative man.

Better Maintenance Performance

AN INCREASE IN productivity of four per cent each year for ten years will produce a total boost in output of fifty per cent.

Four per cent improvement seems like an easy goal, and we see from the above that modest plant betterment on a pay-as-you-go basis can have enormous impact on net income. But to be truly effective the improvement must be consistent—not up one year and down the next.

Ability to continuously improve is the characteristic that separates the competent from the incompetent. Most anyone can improve a bad condition, but to make a good operation still better requires real talent. Commonplace performance can be spotted by looking for the "spurts" in performance. Up and down, up and down, means average or bad supervision. But the smooth high curve means someone is "riding the storms and keeping the ship on an even keel."

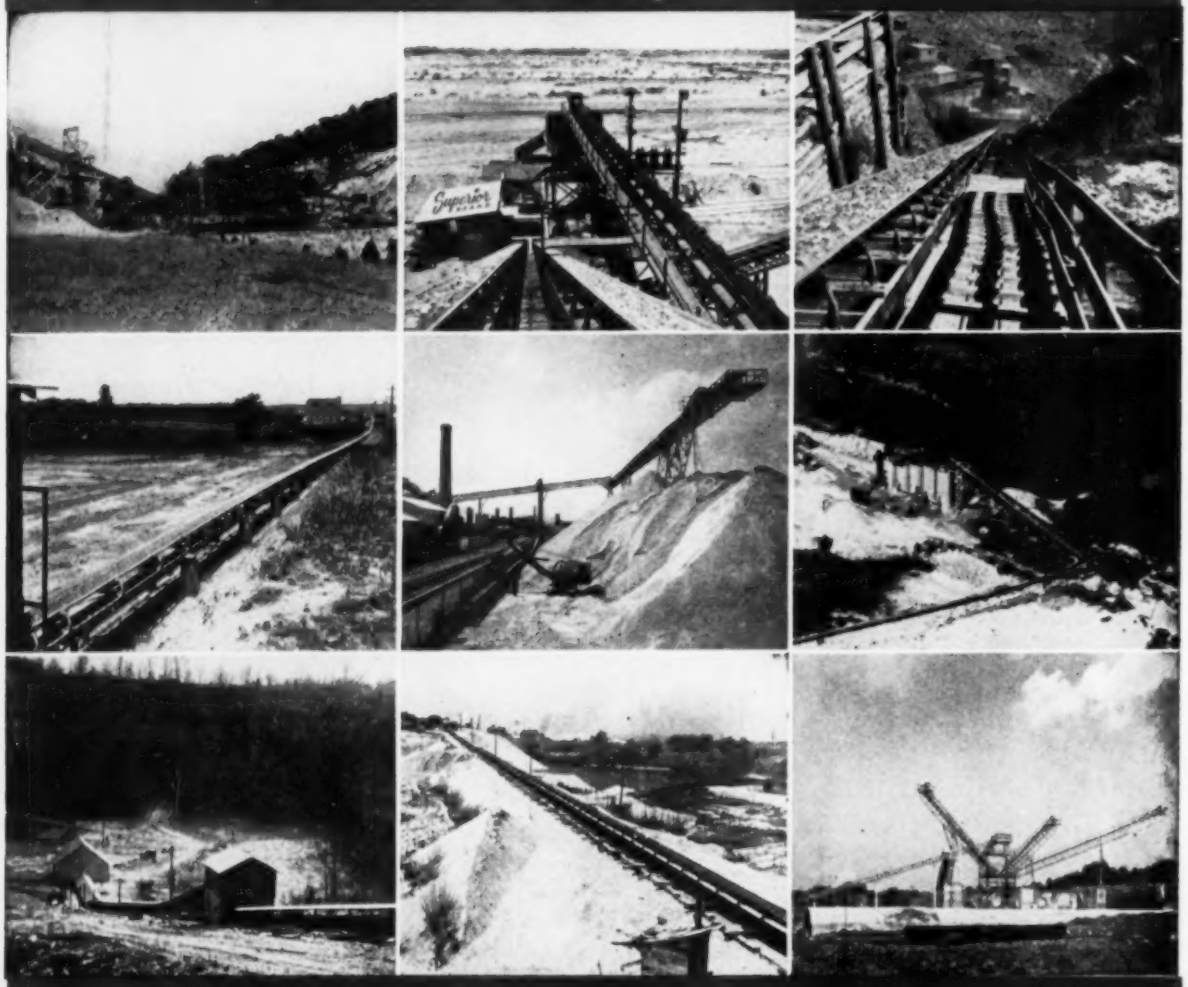
Maintenance crews are particularly subject to ups-and-downs. Actually they perform best when the going is hardest. It is frequently on the everyday grind that they become careless and extravagant. That is why scheduling and record keeping are so important.

Most everyday (normal) maintenance jobs are subject to analysis—experience and records can prove what is good and what is bad performance. It is the job of the supervisor, and each foreman under him, to know what time and materials are required for good normal maintenance. Then they can guide and aid their men toward definite, possible goals, rather than merely complain that "our costs are just too high."

STONE HANDLING!

These are tough jobs—requiring sturdy equipment for long life and uninterrupted service.

That's why these operators specified **Continental**



OTHER PRODUCTS: Elevators, Feeders, Screw Conveyors, Pulleys, Trippers, Buckets, Sprockets, Takeups and Bearings.

For detailed information on these items, write for bulletin S.I.-153

INDUSTRIAL DIVISION

CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

Industry Speaks

Instrumentation Trends

Adapted from comments by Robert K. Stern of Taller & Cooper, Inc., instrumentation engineers and manufacturers, at a Winter Sectional Conference of the Instrument Society of America.

QUALITY CONTROL and plant maintenance supervisors in multi-plant processing operations can now get critical production and performance data in **printed form directly,** from as many as seven or eight different plants as far as four hundred miles away from a central control station, with as much ease as a billing department processes its bills.

Important recent developments in the field of process instrumentation "have made it possible to log in printed form and in correct sequence occurrences taking place as close as ten milliseconds apart. Thus, a complete printing system eliminates not only much of the necessary computation and confusion when data appears rapidly and from many points at once, but it also provides an automatic log, independent of operating personnel.

"Through new applications of such components as self-balancing potentiometers, pressure transducers, digital converters, printers and servo systems," he said, "industry is presented with infinite possibilities of improving process instrumentation and consequently quality and production control."

Mr. Stern pointed out that complete printing systems in industrial plants:

Materially reduce instrumentation space requirements

Relieve supervisory personnel of tedious and time-consuming logging operations

Log all data to a common time reference, thus making comparison of data in terms of that time far simpler and more accurate.

As an example of automatic data recording and annunciating Mr. Stern described his company's Sequential Automatic Recorder and Annunciator—used in many processing and power plants, which features the store-up and memory advantages.

Mr. Stern told the meeting that his company now has a SARA capable of detecting as many as 650 different types of occurrences all taking place within a fraction of a second.

Questioning by the ISA audience of some 150 top instrument designers and plant engineers indicated their active interest in the problem of centrally supervising and logging the operations of multiple plants and unattended stations.

In power plants, for instance, one deviation from normal operating conditions, such as overload, a short circuit, or even a leak, would cause a whole chain of reactions. SARA, in such cases, will provide a continuous record of these deviations. "Her" memory device can store up reports on a chain of occurrences happening ten-thousandths of a second apart and then feed the reports in proper sequence to a built-in recorder or printer.

This means that the attendant at the central control station in the plant or at a remote station has immediately available, for the first time, a completely detailed, written record of everything that happens. In effect, SARA is a sort of electro-mechanical newspaper complete with reporters, editorial desks and printing plant.

Mr. Stern also discussed a number of other control and printing devices available to industry to make the difficult and important job of operation and quality control easier and simpler. One of the devices mentioned was the Digital Converter.

This device converts variable electrical, pneumatic or mechanical data into numbers either through printers or by actuating a teletype machine or card punching mechanism. Thus, processing operations in a large number of plants spread over a considerable area can be recorded at one central control headquarters.

High Capacity Demineralization

Adapted from comments by Martin E. Gilwood, Director of Research, The Permutit Company, before the American Power Conference, Chicago, Ill.

EXPERIENCE and research in efficient boiler operation at high pressures has indicated the importance of maintaining silica contents in boiler salines at low levels, not over 5 ppm. "Higher silica levels result in solution of silica in the steam and subsequent deposition of silica on the turbine blades in the low pressure stages of the turbine." In the near future, at pressure of 1800 to 2400 psi and higher, the maximum silica content permitted will be less than 1 ppm. "Since the make-up water is concentrated many times in the boiler, it has become common practice to specify that the treated make-up water should contain no more than 0.1 ppm of silica."

These and other conclusions were discussed in the presentation. Mixed bed and two-step demineralization by ion exchange are two processes that can be used to reduce the dissolved silica and solids to meet exacting specifications for high pressure boiler feedwater. In fact, the dissolved silica can be reduced to levels approaching 0.01 ppm.

Summarizing, he told his audience, "Commercial development of high capacity ion exchange demineralizing apparatus now offers the possibility of producing economically, water low in both electrolyte content and dissolved silica. In the majority of future installations, low-cost demineralization by ion exchange will be used in place of expensive evaporators for the treatment of high pressure boiler feedwater."

ELEVATORS and CONTROLS

Preventive maintenance does not mean merely trouble-shooting and repair on a haphazard or emergency basis.

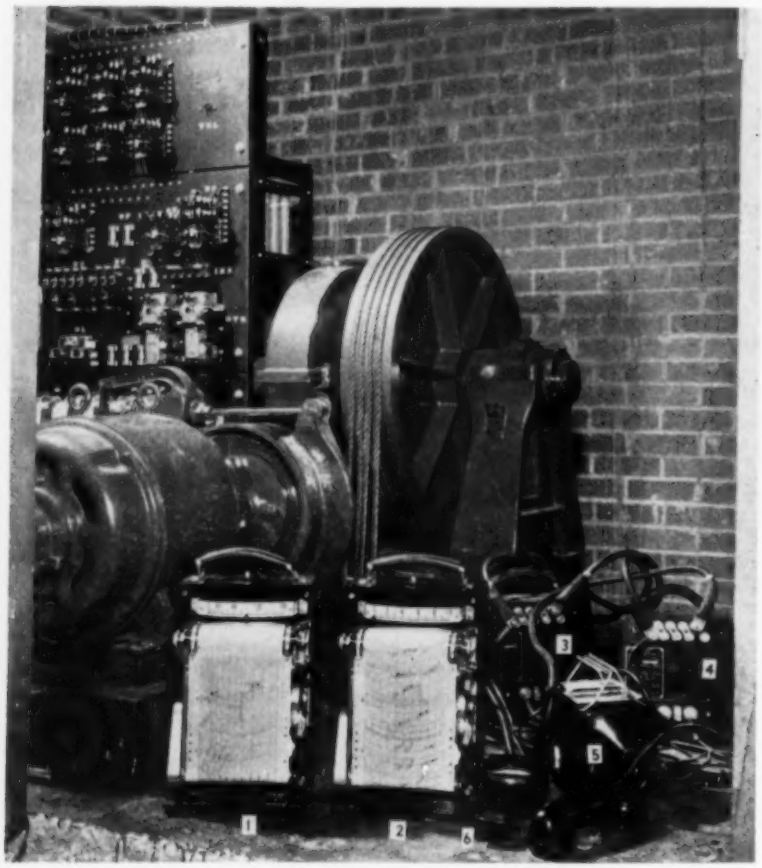
TO BE SATISFIED that we have done our job properly when installing a new elevator, we use for electrical testing: a graphic voltmeter, a polyphase graphic wattmeter, a 500 volt d-c Megger, a torque arm and scale, a low voltage testing outfit and thermometers.

Line voltage variations are always an important consideration on hoisting equipment. We are concerned with how high it goes because some of our equipment must stand across-the-line indefinitely. We are concerned with how low it goes, because elevator motors are rated and selected, not only on the basis of horsepower, but also on the basis of starting torque. Locked rotor torque drops much faster than the line voltage goes down.

We allow for a specific drop in line voltage and select a motor with sufficient torque on that basis. So, we use the graphic voltmeter to give us a permanent record of voltage variations throughout the duration of the test. If there is excessive drop in voltage and it appears that it may go too low for dependable performance, we leave it on the line over a twenty-four hour period to show the highest and lowest values that we may expect. This sometimes requires an increase in capacity of power supply.

We use the graphic wattmeter to give us a permanent record of maximum horsepower input, friction horsepower losses, and to check the accuracy of the counter-weighting. It also reveals any undue friction or tight spots in rail alignment.

We use the 500 volt d-c Megger to test insulation resistance to ground but we use it not only on the wiring system but also on the electrical devices as they are hooked up and used. It helps detect any undue moisture that may be present or the use of paints or other finishes that are not good insulators and, of course, any grounds that may be



Monarch elevators are thoroughly tested after installation. Instruments seen in the illustrations are identified by numerals as follows: (1) triple range graphic voltmeter, (2) graphic wattmeter, (3 & 4) current transformers, (5) megohmmeter, (6) clamp-on ammeter, (7) hoistway telephone.

By J. H. BARTHOLOMEW

Vice President and Production Engineer
Monarch Elevator & Machine Co., Inc.,
Greensboro, N. C.

*Presented before the North Carolina State College Conference on Electrical Equipment for the Textile Industry, Nov. 6-7, 1952.

present in either the wiring or the devices.

We use the torque arm and scale to determine the actual value of torque required to start full load; we clamp it on the motor coupling and use it with the motor in place. We compare this value of torque with the rated torque of the motor and can thereby ascertain about how low we can allow the line voltage to go and still start under full load.

We use a low voltage testing outfit, consisting of flashlight batteries and a lamp for locating any high-resistance or poorly made-up contacts. Contacts in the hoistway or on the car that may function perfectly on 220 volts for a month or two and then fail can usually be detected by using this low voltage. This is one of the things that an elevator tester looks for because they can be troublesome later, and are hard to find.

Maintenance

Now, after all this has been done, what has to be done to maintain the job in its original operating condition? There are two ways to look at it; one is to let it run until it stops and then hunt for trouble, or be called out in the middle of the night to locate a hard-to-find failure or perhaps find a motor burned up and no replacement for it. The other is to check and inspect, at regular intervals, the things that experience has shown will occur through use.

It isn't necessary to constantly check voltages, torque values, and horsepower input. What has been said about testing new elevators is sufficiently complete to give a number of clues as to what may be expected in routine inspections and anticipated faults or failures to avoid costly shutdowns and repairs.

Motor Burn-Outs

Undoubtedly the most hazardous thing that can happen, especially in a wooden penthouse, is a motor burn-out. To safeguard against this, any motor that is locked across the line automatically, such as a full-automatic push-button controlled elevator, or a car switch controlled job with levelling, should be protected with overload relays that really work as they should. We use overload relays to prevent motor burn-outs, not to protect the machine, cables, or car. The motor is the weakest link in the chain of elevator equipment. Any motor may burn up without its being a reflection on the motor manufacturer; it is a reflection on the lack of preventive maintenance, whether it be due to overloads that are never checked, low voltage, lack of lubrication, or any other reason.

Excessive overloading of elevators is a practice that should be condemned, especially if the load is to be lowered. Don't agree to it on equipment you are expected to maintain.

After an elevator has performed properly over a period of months, we know it must be adequate to do its job, but as other equipment is added to power supply lines, the voltage may become unstable. It isn't necessary to have a graphic voltmeter to detect this, of course. Stall the motor across the line by removing a brake lead; read the voltage while the motor is drawing locked rotor current. The voltage must stay sufficiently high to enable the motor to start if we are to lift rated load. No-load voltage readings are meaningless on elevator motor power supply as far as torque is concerned, but they do indicate maximum voltage that may burn up continuous duty devices such as reverse phase relays or other devices that may be required to stand across the line.

Low Voltage Failure

Every piece of electrical elevator equipment has a low voltage point

Re-Newing Elevator Hoist Ropes

Recommended by the State of North Carolina Department of Labor

Just when to replace elevator ropes due to worn or broken wires, rust or corrosion, is a much discussed and not yet definitely settled question. One thing generally agreed upon, however, is that ropes on passenger elevators, where personal safety is paramount, should be discarded before it would be necessary to do so on freight elevators and dumbwaiters.

In order to establish a basis on which rope replacement can be decided as necessary, you are to be guided by the following rules:

Passenger Elevators

TRACTION TYPE

When there are 14 or more broken wires in any one lay.*

DRUM TYPE

When there are 10 or more broken wires in any one lay.*
When ropes are more than 8 years old.**

Freight Elevators

TRACTOR TYPE

When there are 16 or more broken wires in any one lay.*

DRUM TYPE

When there are 12 or more broken wires in more than one lay.*
When ropes are more than 10 years old.**

PASSENGER AND FREIGHT ELEVATORS

1. When ropes are definitely rusted or corroded, pinched, kinked, unravelled or noticeably deteriorated for any other reasons, they should be replaced.

2. When ropes have stretched or worn to a noticeably smaller than original diameter (i.e.: ⅝ in. rope to 9/16 in.), they should be replaced.

3. When one or more ropes on traction type elevators, due to improper equalization or uneven stretch, become broken or worn enough to require replacing on the basis of the foregoing rules, then *all* of the ropes should be replaced.

4. At least once for every year in service all hoisting and counterweight ropes of winding drum type elevators should be re-socketed.

NOTE: (*) A lay is described as the distance which a strand travels to make a complete turn around the rope. (Usually 3½" to 4", depending on the size of the rope.) Most elevator ropes contain 6 or 8 strands of 19 wires each.
(**) A metal tag is to be attached to all new ropes to show the size, make, and date of installation.

at which it will fail; it may not be the motor, it may be the brake or a device on the controller. When this kind of a failure occurs, the only thing that will save the motor is the overload relay. Check it once a month to make sure you can depend on it. If the elevator is equipped with an a-c brake, don't keep the magnet from sealing by using a hammer handle or a screw driver because if you do, you may be saving the motor but you will eventually burn up the brake coil. They draw about twenty amperes with an open magnetic circuit and about one ampere when it is sealed. This is a frequently made mistake.

If you know by checking, that the voltage stays up as it should, you won't have any need for a torque arm and scale.

Testing Contacts

You should locate the terminal markings on door-interlock gate, governor, and over-travel contacts; remove the hatch wiring and test them with all contacts in the closed position with a low voltage test outfit. Do this occasionally to detect contacts of high resistance that are about ready to fail. This is about the only practical way to detect intermittently breaking contacts that work nine times and then fail the tenth.

There probably is no safe and practical way to measure insulation resistance to ground without a good Megger. It should be used occasionally, especially where elevators are working in damp places. Trailer cables that have been in use for a long time may be dangerous to touch if they are not waterproof cables. Some points become conductive on the surface if they are used on electrical devices working in damp places.

Visual Inspections

The foregoing does not include a number of visual inspections that should be regularly made. The main line motor contacts should be examined to see they are not worn or burned to the extent that they are about ready to fail to carry current and cause single phasing of the motor. Brakes should be adjusted and the shoes kept as close to the wheel as possible and with the least possible air gap between magnet faces. This is to make it less sensitive to voltage variations and to permit smoother and more accurate stopping of the car.

Governors and car safeties should be tested once a year at least. If this has been neglected for a long period of time, all the safety parts should be examined to observe that they are workable and free to operate. Applying broken or neglected and improperly adjusted car safeties can be disastrous. Don't attempt to do it with a full load in the car unless you know positively they are in proper working order.

Drum-type Elevators

What has been said about traction elevators applies also to drum-type elevators except they are not always forty per cent over-counterweighted. They can be very dangerous unless they are equipped with a properly adjusted, positively driven, main line machine limit switch. Contacts should be connected in the incoming line leads so that when they are opened they break two of the lines in either direction of car travel.

When a drum machine overtravels because of a control failure, something is going to break. Overload relays may be too late in opening to protect the equipment and a reverse phase relay that does not open in the event of a phase reversal is dangerous because the car will be travelling away from the normal limit that would normally stop it. When a drum machine overtravels and runs to its ultimate limit of travel a major repair job is usually in the offing.

Sticking Relays

There are two points in connection with design of controller devices that are well worth mentioning; one is the cause and effect of "sticking" relays, contactors, or brakes. By "sticking" we mean that a device fails to open the instant its coil is de-energized. If you are experiencing difficulty with erratic or irregular stopping, or occasional overtravels you may suspect that there is a device on the controller failing to open with accuracy. By placing a lamp (preferably a neon) across the coil terminals, you can tell the instant the coil is de-energized. The extinguishing of the lamp and the dropping out of the device should be simultaneous.

In the case of old equipment that has been neglected, sticking may be caused by rust or dirt or for other mechanical reasons, but if cleaning it does not effect its dropping out the instant it is de-energized, you may suspect permanent magnetism is retarding it. On an old style E shaped magnet there must be but two faces that touch the armature. The center face has usually about ten thousandths air gap between

(*Continued on page* 104)

Plant Tested Maintenance Instructions

Overhead Traction 1:1 Roping

WEEKLY

Inspect Control Board
Speed Governor
Bumper and Governor Tension Sheaves
Hoistway Doors or Gates. (Must not run with gates or doors open. Must be securely locked when car is not at landing.)
Door or Gate Locks—Interlocks. (Inspect for mechanical defects.)

BI-MONTHLY

Clean Motor
Check Conduit Fastenings
Clean Hoistway

MONTHLY

Clean Machine and Machine Room
Check Worm Gear Oil Level
Check Worm Gland for Excessive Leaking (not adjustable)
Check Brakes and Pins
Inspect Hoisting Ropes, Governor Ropes, and Fastenings
Inspect Hoistway
Check Limits
Check all Guide Shoes
Inspect Car Enclosure
Car Light, Emergency Switch and Signals
Operating Device
Clean and Lubricate Safety
Car Gate and Contact
Inspect Deflector Sheave
Clean Pit

ANNUALLY

Drain and Refill Worm Gear Case
Check Spider Bolts
Test Car Safety
Drain and Refill Motor Bearings

RECORDS are ESSENTIAL

By D. H. MARSHALL
Assistant Superintendent
Greenwood Light and Water Plant
Greenwood, Mississippi

A PLANT trying to operate without records is similar to a car driver trying to get along with one headlight. He can, with luck, run along smoothly, but he cannot see all the dangers along the road clearly or soon enough to prevent disaster. An average man's memory is not infallible. If one tries to keep all the information in his head, even if he has the best memory in the world, sometime he is going to forget and slip up. This one incident could be of major importance and cost him his job.

It is difficult to conduct preventive maintenance without records. A man can know that a motor should be completely checked every year and have every intention of doing it, but if he does not know exactly when it was last checked, how can he do it? If it runs over the time, damage could result, but it is a waste of money to do the job every six months just because you are not sure when it was last done and want to play safe.

A good record system can be kept in a variety of ways. It can be simple yet complete. In larger plants it will be more complicated. This is because in a large plant there are a larger number of men on maintenance. Each member could think that someone else would do the job and the job would remain undone. Thus, records are essential to prevent this.

But whether a plant is large or small, the records should include a number of facts. These are listed as follows:

Title

Each page or card needs a title so that you can distinguish the equipment from any other in the plant. This should include all information given on the name plate. Then if the name plate is lost or damaged you still have the complete information needed for ordering any spare parts.

It should also include the purpose of the equipment. A motor may be labelled as "Motor for West Condensate Pump" or in any way so that any of the workers know that piece of equipment immediately.

Equipment Number

More for the convenience of filing and keeping the maintenance reports, each piece should be given a number. This should also be painted on the equipment itself. It is usually better to give a letter as well to designate the type of equipment. For example, for motors it is handy to use the letter "M", thus start by calling the first motor M1, next M2 and on up until you run out of motors.

Date

A record without date is useless. You cannot plan any future maintenance without it.

Work Done

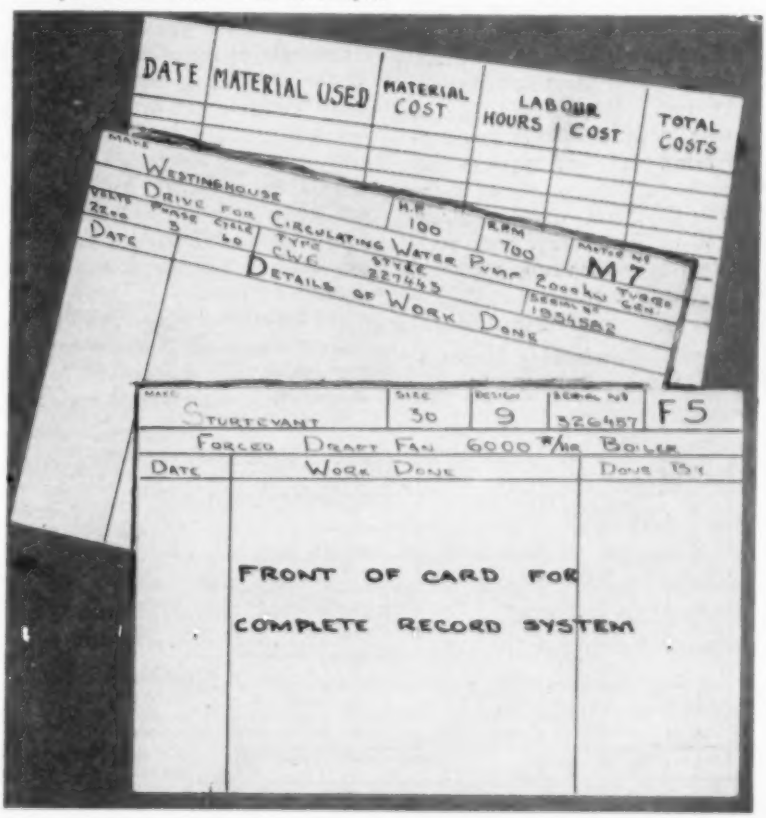
This is actually the most important part of the record. This part should be filled in in detail. It should be clear enough that a power plant man, even if he did not know your plant, would know exactly what was done.

Material Used

This could either be a list of the major items used, such as bearings,

(*Continued on page* 106)

Cards used in the maintenance record system can be as simple and inexpensive as these handmade samples.



DEMINERALIZATION

Make-up Water for Steam Power Plants

Higher pressures demand water of minimum, and preferably no mineral solids. Formerly, such a quality of water could be obtained only by evaporation.

By J. D. YODER

Vice President
The Permutit Company

DEMINERALIZATION by ion exchange is now available to produce the equivalent of distilled water. It accomplishes the same result as evaporation and differs only in the method of accomplishment. The evaporator removes the water as vapor from the mineral solids which concentrate in the evaporator, whereas demineralization removes the solids by ion exchange.

There are two types of power plants that are especially interested in demineralization. First, the steam power plant designed exclusively for the manufacture of electrical power. This is a surface condensing plant and requires only a small percentage of make-up. Second, the plant which produces by-product power with high pressure turbines which supply exhaust steam for process.

Surface Condensing Plants

These plants use chiefly condensate from surface condensers for boiler feed. The small amount of make-up required formerly came from evaporators which were placed in the feedwater cycle, so that the feedwater recovered the heat of evaporation. Whereas evaporators were very extensively used in this manner since 1920, there are a number of specific disadvantages to their use, chiefly as follows:

a) Since the evaporators require steam for distillation and a large ratio of boiler feed to make-up for condensing the vapors, distilled water is not available when the boiler is first put into operation.

b) The capacity of an evaporator, which is tied in with the boiler feed cycle, is limited to a rate proportional to the rate at which the turbine operates.

c) Experience has shown that to deliver vapor of the best quality for which the evaporator is designed, it is necessary to maintain uniform steam pressures on the coils and the evaporator drum. Unfortunately, in the normal operation of turbines, these pressures are not constant but vary with the load on the turbine.

d) The use of an evaporator, even if placed in the boiler feed cycle, causes a substantial energy loss because of heat degradation.

The energy loss due to evaporators for make-up has been evaluated previously* and a curve has been established, see Fig. 1, to show the cost of evaporating make-up based upon the enthalpy degradation, readily available from a heat balance.

Fortunately, demineralization, or

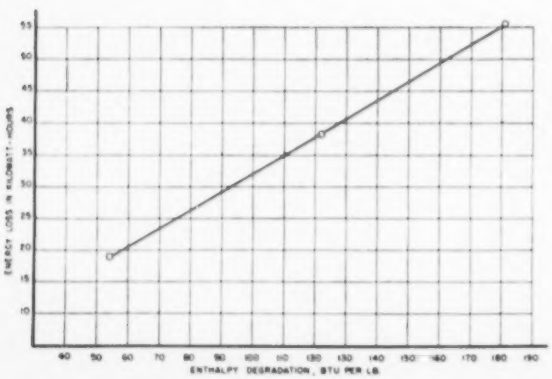


Fig. 1. Curve showing enthalpy degradation Btu per lb of steam to evaporator; and energy loss, kwh per 1000 pounds of make-up.

**Demineralization as Compared with Evaporation of Make-up for Surface Condensing Power Plants*, by J. D. Yoder—Midwest Power Conference Report, Vol. XII, 1950, pp. 61-70.

**Chemical Treatment, Demineralization, or Evaporation for Make-Up in High-Pressure By-Product Steam Plants*, by J. D. Yoder, W. L. Webb and T. Baumeister, Trans. ASME, Vol. 70, 1950, pp. 461-504.

the removal of mineral solids by ion exchange, is not subject to any of the disadvantages listed above. This accounts for the rapid acceptance in recent years of demineralization by ion exchange. A demineralizing system may be operated continuously at its rated capacity if demanded, regardless of the rate at which the turbine operates. For this reason, one can always be assured of an ample supply of demineralized water for boiler feed.

Where a boiler plant is installed, the demineralizing system is placed in operation ahead of the boiler and enough demineralized water is prepared and placed in storage for initial starting of the boiler, following which water is demineralized at whatever rate may be required to maintain the proper water level in the storage tank.

When a demineralizing plant is installed, the cold make-up water is most economically delivered to the deaerating portion of the surface condenser, as illustrated by Fig. 2.

By-Product Power Plants

This type of plant produces power as a by-product of the process steam with a heat rate of approximately 4500 Btu per kwh, or less than one-half the heat rate of a surface condensing power plant devoted exclusively to power manufacture. Such plants require a large amount of make-up, possibly as much as 100 per cent, excepting only the steam that is condensed in heating the feedwater. This type of plant is similar to many that have been installed by chemical industries, oil refineries, paper mills and steel mills, which require both steam for process and power for their operation.

When an industry installs a power plant for steam and process, the first consideration is their process steam requirement. This determines the boiler pressure necessary to produce the anticipated power needs when the turbine supplies process steam from exhaust or extraction. Frequently, a pressure of 600 to 900 psi meets these requirements.

When a public utility installs a

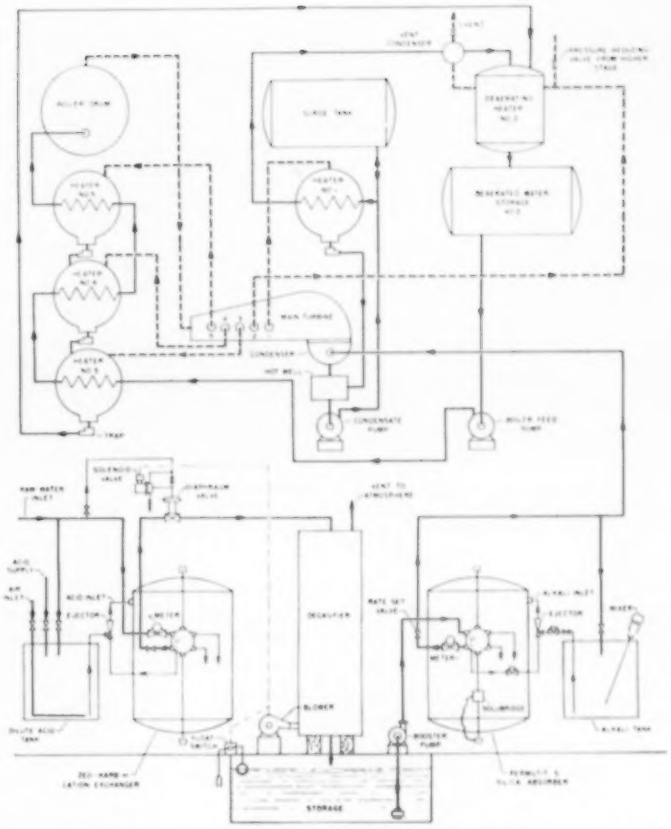


Fig. 2. Schematic diagram of a demineralizing make-up system for a surface condensing power plant.

Table I—Water Analyses

Parts per Million		A	B	C	D
Calcium (Ca)	as $CaCO_3$	2	53	75	0–1
Magnesium (Mg)	"	1.2	21	24	0–1
Sodium and Potassium (Na)	"	170	72	163	0–2
Chloride (C_l)	"	2	46	157	0–1
Sulfate (SO_4)	"	2	34	49	0–1
Nitrate (NO_3)	"	0	2	3	0–1
Bicarbonate (HCO_3)	"	132	0	0	–
Carbonate (CO_3)	"	37	40	40	0–1
Hydroxide (CH)	"	0	10	10	–
Silica (SiO_2)	as SiO_2	25	5	5–6	0.2
Suspended Matter		0	5–10	5–10	–
Total dissolved Solids (calc)		29.1	172	305	0.4
pH		9.0	10.5	10.5	–

Column "D" gives a typical analysis to be expected from either Mississippi River or well water supplies.

NOTE: A. Average well water (design conditions). B. Average clarified Mississippi River water. C. Maximum clarified Mississippi River water. D. Either Mississippi River or well water supplies.

Table II—Dissolved Minerals

Cations		Anions	
Calcium	(Ca++)	Bicarbonate	(HCO_3-)
Magnesium	(Mg++)	Carbonate	(CO_3--)
Sodium	(Na+)	Sulfate	(SO_4--)
Potassium	(K+)	Chloride	(CL−)
Iron	(Fe++)	Nitrate	(NO_3-)
Manganese	(Mn++)	Silicate	($HSiO_3-$)
Aluminum	(Al+++)	Silicate	(SiO_3--)

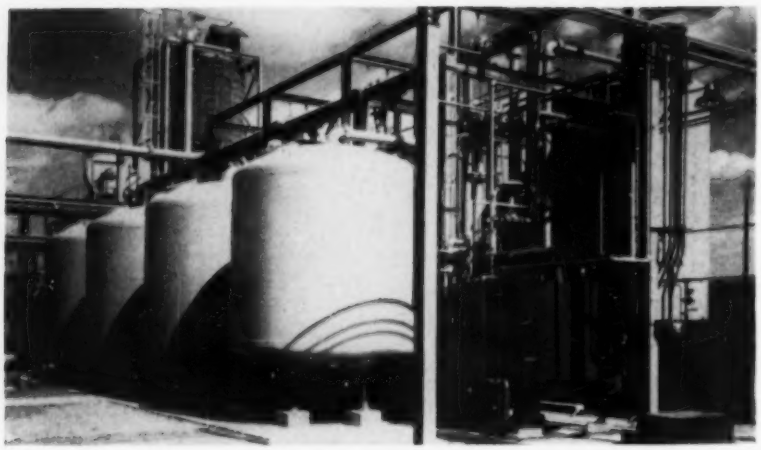


Fig. 3. This is the 96,000 gph demineralizing unit installed at the plant of the Shell Oil Company, Houston, Texas. Shown in the left foreground are the four anion exchanger units containing Permutit S.

plant of this type it has an unlimited demand for this low cost power which becomes available for general distribution. The limitation to boiler pressure is only that which produces the by-product power most economically, which is of the order of 1800 to 2400 psi. Public utilities accordingly produce more by-product power than do industrial plants from process steam.

A good illustration of the type of plant is the Deepwater Operating Company's Station at Deepwater, New Jersey, which supplies process steam at 215 psia pressure to the du Pont Company, and manufactures by-product power from this steam. The first unit of this plant was installed in 1930, with a boiler pressure of 1400 psi.

When this plant was designed it was believed necessary to feed the 1400 psi boiler with distilled water. To accomplish this, evaporators were installed to receive the exhaust steam from the turbine at a pressure of 430 psia. The evaporators in turn produced process steam at 215 psia. This represented a very substantial degradation of heat without obtaining useful power, but it permitted operating the high pressure boiler with a closed feedwater cycle. The amount of make-up with such a plant is small and comparable with that of surface condensers. It was supplied by a separate evaporator.

In 1942, this Station installed the second unit, again using a 600,000 lb per hour, 1400 psi boiler. Instead of exhausting the turbine at 430 psia, it exhausted directly to process. As no condensate from process was returned, this required feeding 100 per cent make-up to the boiler.

For treatment of this water, Permutit supplied a Spaulding Precipitator with filters for clarification, color, and silica removal, followed by sodium Zeo-Karb softeners to deliver water of zero hardness. By exhausting steam from the turbine directly to process instead of to evaporator coils, the Deepwater Operating Station has been able for the past ten years to produce twice as much by-product power from the same amount of process steam with Unit #2 as could be obtained from the first unit. Detailed analyses of the by-product power developed by Units #1 and #2 of this Station were reported by Yoder, Webb, and Baumeister.*

Demineralization by ion exchange had not been perfected at the time of installing Unit #2. For this reason, the make-up water was only softened. Today, with demineralization available, a boiler pressure of 1800 to 2400 psi might be used with a further increase in amount of by-product power.

Gulf States Utilities

Another illustration of a by-product power plant is the Gulf States Utilities, formerly called Louisiana Steam Products Co., Baton Rouge, Louisiana, which installed a 600 psi boiler plant in 1929 to supply process steam directly from the turbine exhaust, and fed the 600 psi boilers with substantially 100 per cent make-up. This make-up was Mississippi River water clarified by settling basins and gravity filters followed by Permutit zeolite softeners and sulfuric acid feeding equipment.

At the present time, the Gulf States Utilities is making an additional expansion, and in order to produce more by-product power, steam is to be delivered to the turbines at 1800 psi. This again requires approximately 100 per cent make-up which will be demineralized by a Permutit automatic 180,000 gph demineralizing plant.

The water may be taken from the Mississippi River, or it may be a mixture of well and Mississippi River waters with analyses as given in Table I.

This will be the largest demineralizing plant yet to be installed in any power plant. The demineralizing equipment required for this plant is:

8—11′ 0″ diameter cation exchangers, capacity each unit—13,000 kgrs.

8—11′ 0″ diameter anion exchangers, capacity each unit—3,800 kgrs.

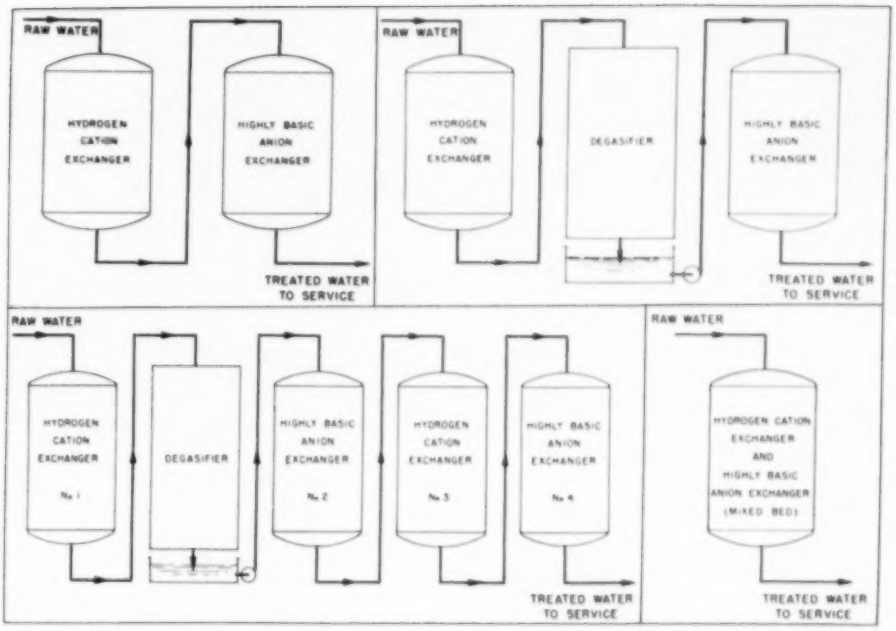
2—10′ 0″ diameter x 34′ 0″ high, vacuum deaerators with Raschig Rings and 3-stage steam jet evacuating equipment. They re-receive the water from the cation exchangers for removing Co_2 and are rubber lined.

Shell Oil

Other large demineralizing plants are in operation, one of which is a 96,000 gph demineralizing plant installed at the plant of the Shell Oil Company, Houston, Texas, see Fig. 3.

Demineralization Procedure

The dissolved mineral matter in water is not present as undissociated salts but is instead present as equal quantities of positively charged cations, and negatively charged anions. Those most com-



Above — left
Fig. 4. Flow diagram of a two-step, without degasifier, demineralization plant.

Above — right
Fig. 5. Flow diagram of a two step, with degasifier, demineralization plant.

Below — left
Fig. 6. Flow diagram of a four step, with degasifier, demineralization plant.

Below — right
Fig. 7. Flow diagram of a mixed bed demineralization plant.

monly encountered in various water supplies are shown in Table II.

In the simplest form of demineralization equipment, the cations are removed by passing the water first through a cation exchanger, Fig. 4, and then through an anion exchanger. The cation exchanger retains the metal cations replacing them with hydrogen cations. Then, in its passage through an anion exchanger, the anions are retained and replaced with hydroxyl ions which unites with the hydrogen ions to form water.

At the end of the demineralization run, the units are backwashed, regenerated, rinsed and then returned to service. The regenerant usually used for the cation exchanger is dilute sulfuric acid. This removes the accumulated cations of calcium, magnesium and sodium and restores hydrogen ions to the cation exchanger. Hydrochloric acid is also used as a regenerant but, due to its higher cost, its use is generally confined to the smaller sizes of plants.

The anion exchanger is regenerated with a solution of caustic soda. This removes the accumulated anions of sulfate, chloride, silicate and bicarbonate and restores hydroxyl ions to the anion exchanger. After rinsing, the cation exchanger and anion exchanger are returned to service, ready to demineralize a further equal quantity of water. The principal costs for demineralization therefore, are for the sulfuric acid and caustic soda required to regenerate the cation and anion exchangers.

In general, the costs for distillation do not vary greatly with varying salinities and compositions of the raw water. Demineralization costs, however, do vary with varying salinities and compositions of the raw water. It costs less, for instance, to remove bicarbonates than sulfates and of two waters with the same mineral salts, it would cost only half as much to demineralize a water containing 15 grains per gallon as one containing 30 grains per gallon.

With the great majority of natural fresh waters, the costs for demineralization are usually only a fraction of the costs for distillation. On the other hand, for highly saline waters such as sea water or highly brackish waters, the relative costs are reversed and distillation becomes the only economical method of freeing such waters from their salts.

Arrangements of Equipment

Depending on the composition of the water, the amounts to be handled, and use requirements and other factors, various arrangements of demineralization equipment are employed. For instance, when a water containing bicarbonates is passed through the cation exchanger, the cations are removed by the exchanger and the carbonic acid formed breaks down into free carbon dioxide and water.

This free CO_2 can be removed by passing the effluent through a degasifier, Fig. 5. In the degasifier, the CO_2 is removed simply by blowing air upward through the degasifier, whereas if it is removed by an anion exchanger it increases the size and cost of the anion exchanger as well as the cost of chemicals for regeneration. For this reason the arrangement shown in Fig. 4 is used only when the bicarbonates of natural water are relatively low. The quantity of carbonates that may be present without using a degasifier depends to some extent on the capacity of the plant. For small capacities, the greater simplicity of Fig. 4 may be of more importance than the lower cost of operation with a degasifier.

With most waters, either of these arrangements gives an effluent comparable with a once distilled water. However, if the water contains very appreciable amounts

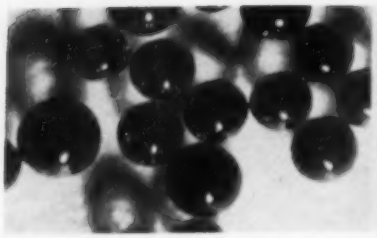


Fig. 8. Photomicrograph of the cation exchange resin, Permutit Q, a sulfonated styrene type material.

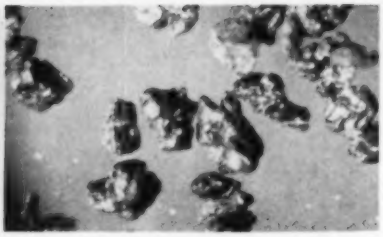


Fig. 9. Photomicrograph of Zeo-Karb, a sulfonated, granulated, prepared, bituminous coal.

of sodium sulfate or sodium chloride and the end use tolerances are very small, then a four step arrangement, Fig. 6, or a mixed bed arrangement, Fig. 7 may be used.

Mixed Bed Demineralization

In the mixed bed, the cation and anion exchanger are intimately mixed before the demineralization run. The effect therefore is similar to an extremely large number of alternating cation and anion units. Under such conditions, the removal of electrolytes is so complete that the effluent may have a specific resistance of some 15 or 18 million ohms which corresponds to 0.01 ppm of ionized salts. Silica is only slightly ionized and therefore has little effect on electrical resistance. Careful checking of performance of mixed bed effluents indicates that the silica is not reduced below that obtainable from a two-bed system. The few ppm of electrolytes from a two-bed system is of no importance for boiler feed if these are a mixture of sodium chloride, sodium sulfate, and caustic soda.

In general, the mixed bed treatment is more expensive than either the two step with degasifier or four step with degasifier arrangements, because it is cheaper to remove carbon dioxide with a degasifier than by ion exchange. When a mixed bed demineralizer is to be regenerated it is necessary to regenerate the anion and cation exchangers separately with caustic soda and sulphuric acid respectively. This requires:

1) Backwashing the bed at a rate of 3 to 3½ gallons per sq ft per minute which raises the anion exchange material to the top because its density is less than that of the cation exchange material.
2) Regenerate the anion exchanger with caustic soda and rinse it.
3) Regenerate the cation exchanger with sulphuric acid and rinse it.
4) Mix the cation and anion exchangers homogeneously by a controlled air pressure.

Methods have been devised to properly carry out these separate functions but to accomplish the regeneration satisfactorily every step must be properly carried out. Admittedly, the regeneration is somewhat simpler if performed in separate containers.

Demineralization Equipment

The cation exchange material may be either Permutit Q, Fig. 8, a sulfonated styrene type resin, or Zeo-Karb, Fig. 9, which is a sulfonated granulated and suitably prepared, bituminous coal. Each material has its advantages for certain waters, and both materials are usually regenerated with sulphuric acid.

The anion exchange material is a highly basic resin that removes both strongly and weakly ionized acids. Its appearance is similar to Permutit Q. Normally, the cation and anion exchange materials are placed in separate rubber lined tanks equipped for regeneration with sulphuric acid or caustic soda respectively.

The design and accessories of the tank are quite similar to the well known sodium zeolite softener. The chief difference is that salt (sodium chloride) is used for regenerating zeolite water softeners whereas sulphuric acid and caustic soda are used respectively for regenerating the cation and anion exchangers. Proper precautions must be taken with piping, accessories, and tanks, to protect them against attack by acids.

The degasifier, Fig. 10, removes

(*Continued on page* 114)

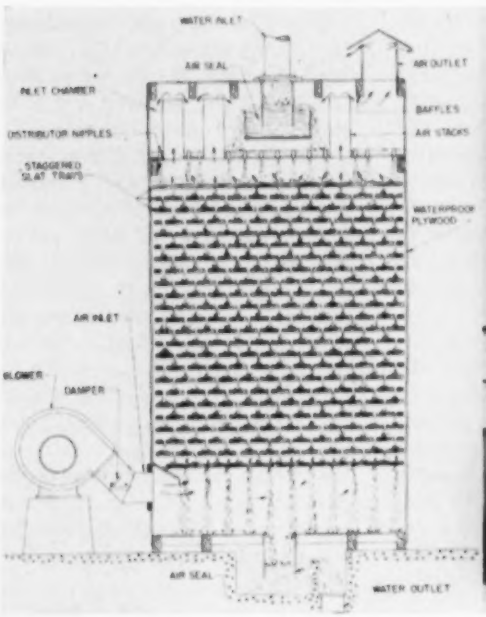


Fig. 10. Cutaway drawing of the Permutit Degasifier. This unit can be used for removing free carbon dioxide gases from water.

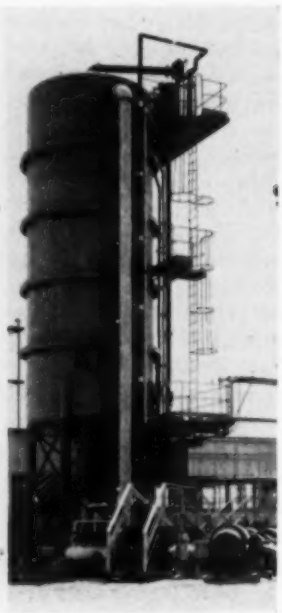


Fig. 11. The Permutit Vacuum Deaerator removes oxygen and carbon dioxide, thus protecting piping, tanks, etc., from corrosion.

Maintenance of ELECTRIC HOISTS

"Performance Insurance" is Free

By JOHN R. MEARS and STEPHEN A. GRIMES
Sales Manager and Service Manager, Hoist & Crane Div., Robbins & Myers, Inc.

Here's why you should follow installational instructions. Typical trouble spots—trolley wheel clearances, beam joints, power, grounding, current pick-ups, overloads, lubrication, and need for new cable.

THE PREMISE on which maintenance practices are based is the simple but often forgotten fact that all machines are subject to wear. Machines on the floor will get some maintenance attention if only to stop the annoying leaks and squeaks that distract the operators attention. But hoists are built to be mounted out of reach—and sometimes being out of reach, they go out of mind insofar as maintenance is concerned.

Hoist manufacturers realize this and provide extra margin of design safety, both as to the need for maintenance as well as protection against maintenance failures. But even the wisest hoist builder cannot always foresee the extent of neglect to which his product may be subjected, nor has he any control whatsoever over the mistreatment which his product may be given by unthinking operators.

Tag—You're It!

You're it, from the moment a new hoist arrives for installation. Resist that impulse to snatch off all the tags fastened about the hoist. When you do so, you are automatically starting your new hoist out with poor maintenance. The manufacturer does not hang tags on his hoists just for fun. What he is trying to do is get you and your new hoist off on the right track in a maintenance sense, for poor or incorrect installation is also poor and incorrect maintenance. Follow the tag instructions and you will be doing everything possible to assure that the first time power is applied to

These tags aren't hung on hoists just for fun. The manufacturer is trying to get you and your new hoist off on the right track in a maintenance sense, for poor or incorrect installation is also poor and incorrect maintenance.

The booklets that are packed with your hoist are source material for good hoist maintenance, as well as what to do when things go wrong. Make sure that they are put where they will not be lost, and where they can be gotten quickly when things go wrong.

your hoist things will go as planned.

The tags are a check list for hoist installation, and assure that basic lubrication will be accomplished, that vented plugs will replace solid shipping plugs, and that wiring connections will be correct. Simple things, but they are the physical examination that helps assure healthy hoists.

Installation Complete?

The hoist is hanging; each tag has been removed and checked; the hoist lifts a load, stops, lowers, and travels at your command, but is the installation complete?

Have you checked trolley wheel clearances? Clearance should be ⅛ in. between beam flange and wheel for straight track, and slightly more on curves. Is the hoist centered? It should hang centered under the beam, and if it does not then spacers provided should be adjusted to accomplish this.

What happens at beam joints? If the trolley rolls smoothly over joints everything is fine, but if it bumps, then you will get excessive wheel wear.

What about the trolley stops at the end of the beam? If they strike the trolley frame or the wheel bumpers O. K., but if they strike the wheels the king-pin connections take the shock and there will be a premature part failure at that point.

And most important of all, have you made sure that the power supplied to the hoist matches the ratings given on the hoist data plate, and that an adequate electrical ground has been made?

How about the current pickups? Excessive arcing indicates that they need adjustment, and they should, whether wheels or shoes, be adjusted so that they are centered under the power conductors.

From Day to Day

Watch out for overloads. Hoists have generous safety allowances for overloads, that is a matter of common sense. But continual overloading of a hoist will shorten its life in general, and set the stage for nasty accidents when overload failure takes place at the wrong moment. Check for overload beyond the hoist too. A five ton capacity hoist that is mounted on a beam capable of handling only one ton is just as bad as a one ton capacity hoist trying to handle a five ton load.

Keep your cables lubricated with 600 W. Check daily to see that cable has plenty of lubricant on it. (Depending on service and care cable life will range from three months to two years.)

Where possible, periodic swapping of cables end-for-end will help equalize wear and give you a chance to check for fraying and broken strands that are a cause of failures.

Make sure that with the hook at the lowest point of travel throughout your shop there are still at least two wraps of cable around the drum. This will ease direct strain on the cable anchorage and prevent possibility of the cable running clear off and winding up on the wrong side of the drum, reversing the controls and cancelling out the protective features of the limit switch.

Whenever electrical work is done about the plant make sure the changes have not changed the polarity of the power supplied your hoists.

Once a Month

Check oil level in the gearcase, wear on sheaves, condition of cable or chain, cleanliness of beam tracks, and general operation of the hoist throughout the system.

Twice a Year

Check motor coupling for wear. Too much wear will affect the accuracy of operation of the hoist, and if allowed to increase probably end in a major maintenance job to replace torn keyways.

On hoists with fibroid coupling discs, make an inspection to see that they are fairly dry. When fibroid discs get too oily they lose effectiveness, and wear unduly.

Motor lubrication, generally, should be done only twice a year, and then according to the manufacturers' specifications, not according to your whim! Why? Because one of the major causes of motor failure is over-lubrication.

Check the motor brushes too, for cleanliness and excessive wear. Replace worn brushes if you want your hoist to keep operating most efficiently.

At Least Once a Year

Check for wear on cable drums and cable sheaves.

Clean hoist thoroughly.

Check everything for signs of wear and failure.

Replace seals or gaskets where there is any evidence of lubricant leakage.

Lubricate controller fingers and segments with vaseline—but sparingly.

Check trolley alignment, current pickups, insulators, in fact the entire system!

When You Need a New Cable

Wire rope is not necessarily hoist cable. We supply genuine plow steel cables with our hoists and feel that only a like cable should be used as replacement. Good maintenance means that you have a spare cable on hand.

Good maintenance also means

that at cable change you also install new sheaves if there is the slightest indication of grooving or abnormal wear, and that you make sure the drum and cable socket are not worn or damaged.

Under no circumstances should a new cable be allowed to kink or twist as you uncoil it, for this will assure early failure.

See that the new cable is lubricated as it is installed, and that the cable is wound smoothly on the drum without crossovers or pinching.

Lubricate your cable regularly by slushing it with 600 W to combat acid and rust deterioration. Test with cotton or waste by running it along the length of the cable; this will pick out any frayed strands. Avoid abnormal lifts such as dragging loads, offside lifting, and up-ending loads. Such treatment produces abrasion and shock that either break the cable or reduce its life.

Keep Spare Parts on Hand

Like a good spare tire on your car, spare parts for your hoist may well save many dollars of production time when something goes wrong.

A "typical" assortment of spare parts should include those parts most subject to wear, and would include most of the following:

Cables
Load Brake Friction Disc
Motor Coupling
Fibroid Coupling Discs
Hook Assembly
Electrical Coils and Contacts
Brake Friction Discs

This list is specific to no one hoist. The manufacturer of your particular hoist is the best source of specific parts information on his own equipment.

Recorder Checks Six Bearings; Warns of Impending Burn-Outs

A Multi-Record Dynalog Recorder with a built-in alarm system can furnish valuable information in the protective maintenance of generators, compressors and similar machinery. Made by The Foxboro Company, the electronic recorder prints a continuous record of as many as six bearing temperatures and gives the alarm when any such temperature approaches a danger point.

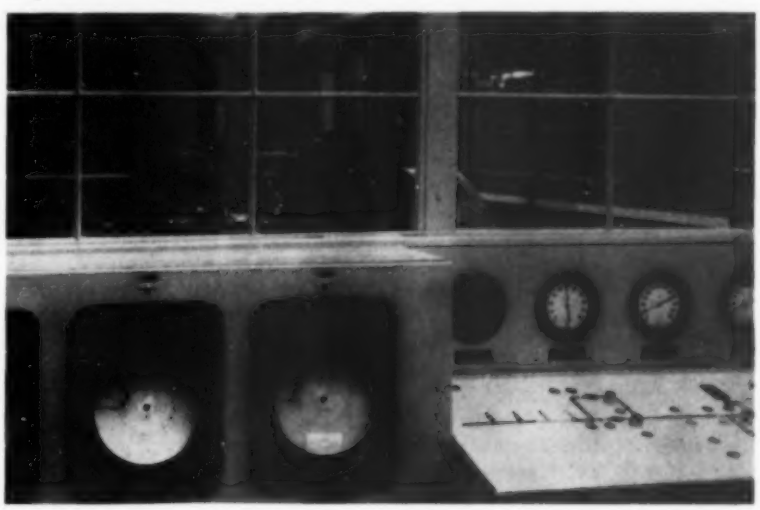
A typical installation is in the Longview, Texas, pumping station of the Mid-Valley Pipe Line Company, where crude oil begins its long journey to Lima, Ohio. A Dynalog Recorder, for each pump, is an important instrument on the main control panel. Identical controls are provided at all of Mid-Valley's eight engine driven stations, and similar installations are at Mid-Valley's five electric motor driven stations.

Installation

Located in the central control room, the three instruments log the bearing temperatures of their respective Byron-Jackson pumps and Pacific-Western gears. By observing the instrument charts, the station operator has a complete and continuous picture of pump and gear bearing conditions and is assured of the safety of this valuable equipment. The file of daily charts furnishes a written history of each unit's operation, and any creeping deviation from the normal, safe standards is revealed in time for corrective steps to be taken.

An unusual characteristic of the Foxboro Multi-Record Dynalog Recorder is the high speed with which it prints its separate temperature records. As many as six records, each in a distinctive color, are made on the one circular chart, the recording pen printing colored dots at six-second intervals, so that the dots form virtually unbroken lines.

In the Longview pumping station the six temperature points recorded for each pump unit are: inboard and outboard bearings, inboard and outboard bull gear bearings, and inboard and outboard pinion gear bearings. Should any of these threaten to overheat, and its temperature reach the pre-set danger point, a horn sounds and a signal lamp is lighted on the control panel, with the instrument showing the operator which bearing needs attention.



Control board in the Longview, Texas, pumping station of the Mid-Valley Pipe Line Company, showing the three Foxboro Multi-Record Dynalog Recorders, each recording six pump bearing temperatures. Graphic panel with signal lights is at right. Glass partition separates pump room, in background.

Care and Maintenance of Factory Chimneys

Too often, industrial chimneys are taken for granted and ignored. A chimney in good condition is a valuable asset to a plant, but in poor condition it may constitute an economic liability and occasionally a serious hazard.

By ARTHUR M. CLARK
Assistant Chief Engineer
Custodis Construction Co., Inc.

THIS ARTICLE is written primarily for the owner and operator of a plant or factory using a brick, concrete or steel chimney in connection with steam boilers discharging gases into the chimney at temperatures from 400 F to 800 F. Chimneys for discharging high temperature gases, and for discharging particularly corrosive gases are special problems, and will not be dealt with in detail in this article.

It must be remembered that all fuels contain a varying amount of sulphur, and that the products of combustion contain sulphur compounds which, when combined with moisture, form acids. The acids thus formed are usually so weak or diluted that they will not rapidly attack a good chimney brick, reinforced concrete or well painted steel. However, where condensation takes place, these acids may slowly attack the mortar joints and cement water tables of a brick chimney, just as it will corrode concrete or steel. The acids also attack the lightning protection system at and near the top of the chimney. In time, ordinary atmospheric weathering contributes to deterioration of the mortar joints, the occasional spalling of the brick or concrete, and to the corrosion of a steel stack and the metal parts of the lightning protection system of any chimney.

Inspection

What can the plant superintendent or works manager do about this? In the first place, if the plant has a brick or concrete chimney, he should contract with a reputable chimney builder to have his chimney inspected on an annual or bi-annual basis, so as to have at hand a running history of its condition. Such concerns maintain a staff of competent and experienced inspecting engineers for this purpose.

Unless otherwise indicated, the inspecting engineer views the chimney from the outside with powerful glasses, with particular emphasis on the upper portion of the chimney where deterioration is most likely to occur. He also looks for cracks which may develop due to foundation settlement or thermal stresses, and for any other irregularities. The inspecting engineer reports his findings to the plant officer responsible for the chimney, and forwards a report to his organization whose Service Department confirms the findings to the owner, together with recommendations, if such be necessary, for restoring the chimney to a first-class condition.

In this connection it should be mentioned that a number of chimney inspection and repair organizations solicit this type of business, usually by touring the country, ready to go to work. Often these companies or individuals are not thoroughly experienced or competent, and sometimes they will recommend repairs that are not justified by the actual condition of the chimney. Most owners prefer to have inspections made and maintenance work performed by chimney builders having years of experience, knowing that such a policy will assure them many years of useful service from their chimney, and to whom they have redress.

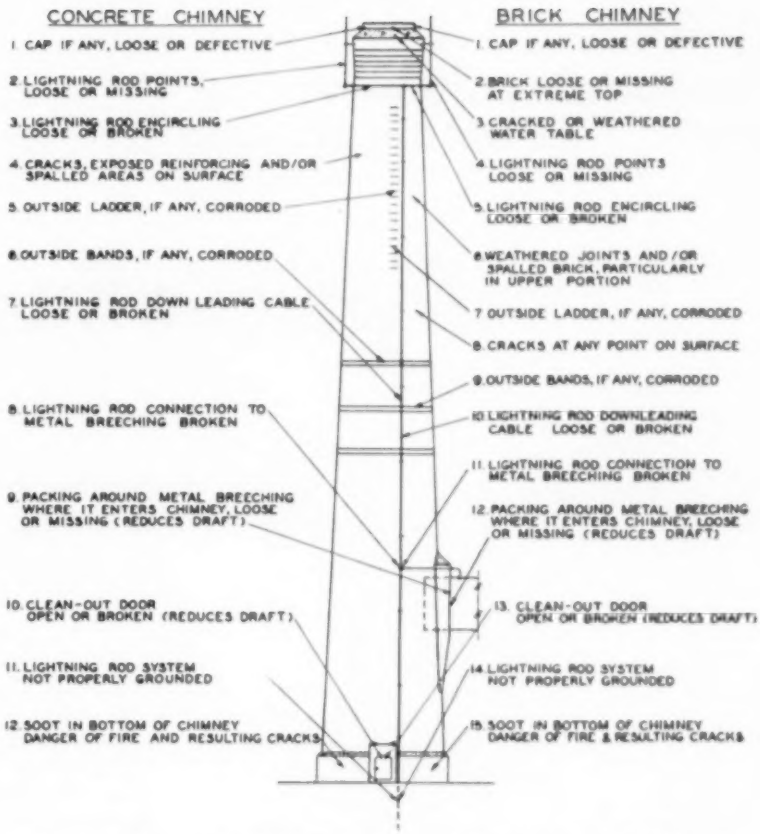
Steel Stacks

If the plant has a steel stack, the

owner should arrange to have the stack scraped and painted at regular intervals which will depend on the temperature and quality of the gases, the local atmospheric conditions, and the type of paint used. Paint suitable for this purpose is sold by the leading paint manufacturers and is described in their literature.

Secondly, the plant official responsible for the chimney should be "chimney conscious." He should from time to time between inspections, and particularly after local thunderstorms, look at the masonry chimney to see if any cracks have appeared or if any parts of the lightning protection system have become broken or loose. If he finds these, or any other irregularities, he should communicate with the firm making the periodic inspections and ask that a special inspection be made to determine whether or not prompt repairs are required.

If the plant has a steel chimney, the condition of the paint should be watched, the guy wires, if it is a guyed stack, should be maintained at equal tension and the anchor bolts should be kept tightened.


CONCRETE CHIMNEY
1. CAP IF ANY, LOOSE OR DEFECTIVE
2. LIGHTNING ROD POINTS, LOOSE OR MISSING
3. LIGHTNING ROD ENCIRCLING LOOSE OR BROKEN
4. CRACKS, EXPOSED REINFORCING AND/OR SPALLED AREAS ON SURFACE
5. OUTSIDE LADDER, IF ANY, CORRODED
6. OUTSIDE BANDS, IF ANY, CORRODED
7. LIGHTNING ROD DOWN LEADING CABLE LOOSE OR BROKEN
8. LIGHTNING ROD CONNECTION TO METAL BREECHING BROKEN
9. PACKING AROUND METAL BREECHING WHERE IT ENTERS CHIMNEY, LOOSE OR MISSING (REDUCES DRAFT)
10. CLEAN-OUT DOOR OPEN OR BROKEN (REDUCES DRAFT)
11. LIGHTNING ROD SYSTEM NOT PROPERLY GROUNDED
12. SOOT IN BOTTOM OF CHIMNEY DANGER OF FIRE AND RESULTING CRACKS
BRICK CHIMNEY
1. CAP IF ANY, LOOSE OR DEFECTIVE
2. BRICK LOOSE OR MISSING AT EXTREME TOP
3. CRACKED OR WEATHERED WATER TABLE
4. LIGHTNING ROD POINTS LOOSE OR MISSING
5. LIGHTNING ROD ENCIRCLING LOOSE OR BROKEN
6. WEATHERED JOINTS AND/OR SPALLED BRICK, PARTICULARLY IN UPPER PORTION
7. OUTSIDE LADDER, IF ANY, CORRODED
8. CRACKS AT ANY POINT ON SURFACE
9. OUTSIDE BANDS, IF ANY, CORRODED
10. LIGHTNING ROD DOWNLEADING CABLE LOOSE OR BROKEN
11. LIGHTNING ROD CONNECTION TO METAL BREECHING BROKEN
12. PACKING AROUND METAL BREECHING WHERE IT ENTERS CHIMNEY, LOOSE OR MISSING (REDUCES DRAFT)
13. CLEAN-OUT DOOR OPEN OR BROKEN (REDUCES DRAFT)
14. LIGHTNING ROD SYSTEM NOT PROPERLY GROUNDED
15. SOOT IN BOTTOM OF CHIMNEY DANGER OF FIRE & RESULTING CRACKS

Here are the items that should be checked carefully when inspecting chimneys.

Common Neglect

In addition to normal corrosion and weathering, chimneys are sometimes unknowingly abused in one or more ways resulting in damage to the chimney. The most common abuse is failure to keep the bottom of the chimney free from an accumulation of soot or combustible fly-ash. All chimneys are provided with a clean-out door near the bottom.

If the bottom of the chimney is not cleaned at regular intervals, secondary combustion may occur in the accumulation of soot, fly-ash, etc., producing thermal stresses and resulting cracks in a masonry chimney or in the lining of a brick-lined steel stack. If a fire has occurred in the chimney, a careful interior inspection should be made by a competent inspector to see if damage has been done to the lining or to the interior chimney walls.

Another often encountered abuse is the introduction into the chimney of gases whose properties are different from the gases for which the chimney was designed. Introduction of exhaust steam or corrosive gases into an unprotected chimney will hasten deterioration. Connecting an incinerator to a boiler chimney may result in cracks in a masonry chimney unless it is designed for this service, or may burn out an unlined steel stack. If a chimney designed and built to serve steam boilers is to be used wholly or partially for another purpose, the builder of the chimney should be consulted for recommendations as to modifications which may permit the intended use without damage to the structure.

Changes

When new or additional boilers are installed, it is often necessary for the breeching to enter the chimney at a location other than the flue opening originally provided. In such cases the builder of the chimney should be called in to approve the size and location of the new opening and to perform the actual work of cutting the new opening.

This work calls for special knowledge in designing the new opening and skill in bonding the extended face of the new opening into the original brickwork in the case of a brick chimney so that the chimney is not structurally weakened. Under no circumstances should other than a well known chimney building concern be engaged to perform this type of work.

If additional draft is required, and the most practical way of providing for this is by increasing the height of the chimney, the builder of the chimney, who has retained the original design computations, should be asked if this can be done without endangering the stability of the chimney. Failure to do this is an invitation to possible collapse of the chimney at worst, and serious cracking at best.

Care When Idle

If a chimney is to be taken out of service for any length of time, it is important to have a waterproof cover installed at the top of the chimney. This will, in the case of

(Continued on page 140)

The horizon fairly glows with promises for the future under

Dynamic Business—Our

By CRAWFORD H. GREENEWALT
President, E. I. du Pont de Nemours and Company

SINCE the turn of the century, the American business system has given our people a standard of living that is the envy of the world. It has made us strong enough to be the global guardian of freedom. The horizon fairly glows with promises for the future.

How far have we come since 1900? The statistics are impressive. Here are a few from a study just published by Professor Frederick C. Mills of the National Bureau of Economic Research:

1. During the decade ended in 1950, we produced five times as much as we did in the decade 1891-1900.

2. This five-fold production required only an 80 per cent increase in total man-hours of labor.

3. The output per man-hour of labor has nearly tripled in the half-century.

This means the American people are producing more wealth with fewer hours of work than our grandparents ever dreamed could be possible. It isn't because we are stronger, bigger, or work faster than our grandparents. New and better tools and methods, the creation of an ever-expanding industrial plant, the unceasing search into the unknown—these have given our people a fantastic reward.

The material benefits of this quintupled production of goods and services are apparent wherever we look. In food, clothing, shelter and transportation, and in ease, convenience and comfort, the standards of even the most modest American home go steadily upward. What is initially hailed as a modern convenience quickly becomes a modern necessity. Where else in the world could an Official Consumer Price Index include such items as television sets and beauty parlor services?

In sociological terms the change has also been marked. Fifty years ago there was a great difference in living standards between the working man and the owner of a factory. They lived in different neighborhoods, wore different kinds of clothes, and had a widely different degree of comforts and diversions.

Today they eat much the same meals. They drive to work in comfortable, dependable automobiles—one may ride in a Ford and the other in a Cadillac, but both travel well. Either may spend his vacation in Florida or in the Rockies. Their homes may differ in size, but they differ little in comforts for the family—both have automatic heating units and modern equipment of all kinds in the laundry, the kitchen and the bathroom. They wear virtually the same clothes, and so do their wives. Both see the same television programs on the same kind of set, attend the same concerts and ball games. It is the only country in the world where this situation exists.

Since 1900, our life expectancy has increased by nearly a quarter of a century. Diseases which once were almost certain killers have been conquered. American boys and girls go on to college where their grandparents had to start work at the grade school level. The work week has fallen from 60 and 48 hours to a 40-hour standard. Mechanical appliances and revolutionary methods of preserving and packaging foods have emancipated women from the kitchen—and they now take an active interest in business, sports and civic affairs.

All of these gains are by-products of business progress. If this is disputed by fellow-thinkers of the left wing, let them try to institute by law or government fiat a 40-hour week for the workers of Red China. It would bring rebellion or starvation. Without tools and machinery, the people of China can't produce enough to keep themselves alive without working longer hours. Nor was the shorter work week attainable by our own grandparents. Social reform stems from productivity—it is never the root.

Even the boldest of us would have difficulty fore-

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Best Guarantee of Progress

No. 6 of a series on problems of business and government

MR. GREENEWALT, who joined the du Pont organization as a chemist immediately following graduation from M.I.T. in 1922, has had an important part in many of the company's most notable achievements, including its contribution to the government's atomic energy program. Widely recognized as one of the nation's outstanding industrial leaders, he has been president, chairman of the Executive Committee and a member of the Finance Committee of the du Pont company since January 1948.

casting the full brightness of the future if American business is permitted to continue its development in freedom. There is no evidence that the prophets of 1900 foresaw air-conditioned trains, fine fabrics made from air, water and coal, super-highways traveled by sleek automobiles, or man-made rainstorms. Certainly they didn't envision intricate industrial plants where workmen watched gauges and were safer from accident than in their own homes. Nor could they have foreseen the splitting of the atom to release energy terrible in war, but with vast potentials for peace.

Competition is the Spark

But even the prudent may assume with confidence that today's industrial laboratories are testing formulas that could bring progress as spectacular in the last half of this century as we have witnessed in the first. For instance, half of the du Pont Company's sales last year were of products unknown or in their commercial infancy 20 years ago. Yet our company spent $50,000,000 for research in 1952, and will spend at least as much for that purpose this year. Other firms, large and small, attach equal emphasis to the importance of research and development. They must if they are to meet their competition and survive.

For competition, in the last analysis, is the spark which ignites our business system. There would be no progress if business were content to sell the same products, made in the same way, at the same price to the same markets. If any firm tried to do that in America, it would quickly discover that a competitor had developed a new or better product, or had found a way to manufacture the old product at less cost for sale at a lower price. The customer naturally would buy from the competitor. The standstill firm would go out of business.

As long as men are free to seek reward through their own productive effort, the United States will never cross its last frontier, nor stagnate in a "mature" economy. A dynamic business system is our best guarantee of progress and a better life for all.

In recent years, Socialists in theory and practice have conducted a running attack upon American business and businessmen. Their theme is that "government could do it better" than free men operating in a free economy. They found converts in recent federal administrations. With skill and cunning they used the government's powerful propaganda machinery and its

rich treasury to build up a substantial following among the general public.

The American people can be thankful that their Congress, refusing to be swept off its feet, rejected many of the Socialist proposals which were advanced. Steps were taken, nevertheless, that already have hampered and could interfere seriously with the business development that is essential for continued progress.

Financial Incentive Riddled

Tax laws have been written, for example, which retard business development and destroy incentive. The misnamed "excess profits tax" discourages industrial growth and the introduction of new products. It is due to expire June 30, 1953, and it is to be hoped it will. If it had not been a temporary expedient, we would already be experiencing its dulling effects. If it is continued, we shall certainly feel them.

Steeply progressive taxes on personal incomes present another problem. Since the war they have been raised to confiscatory levels which dry up the sources of capital for new business. These high rates also stand in the way of recruiting young people capable of assuming top business leadership in the future.

Business management must compete with government, education, the armed forces, and the arts and professions for its new blood. These other careers offer intangible attractions such as personal prestige, public notice and power, more leisure and independence, and humane or scientific accomplishment. Business management is largely anonymous—a team effort with few featured performers—and its most important reward for work and worry is financial.

While crushing taxation in the upper middle brackets has little effect upon the rates which those at lower levels must pay, it has riddled the financial incentive which is all business can offer to its future executives. As taxes eat away at incentive, so more of our able young people will seek other fields, and fewer of those who are with us will be urged on to those extra efforts that are the difference between success and mediocrity. And business will be that much less able to fulfill its responsibilities to the nation.

There is another field for concern. While there must be rules for the conduct of business, just as in any other human activity, the laws as administered during recent administrations seem complex and often contradictory. A company which engages in aggressive competition, as directed by one statute, finds itself in trouble under another precisely because of its competitive vigor. Management spends both time and money better devoted to other ends in litigation and effort attempting to discover which business practices are permitted and which are not.

Our expanding economy also has encountered in government the curious theory that anything in business which is big is necessarily bad. Function should govern size. We use a spoon to lift sugar into our coffee, but if we want to move a coal pile, we look for a steam shovel. It is interesting to note that so does the government.

The critics of our business sytem have enlisted public support by cultivating the notion that government can and should guarantee security for everyone. We must always remember that a government produces nothing. It is only when wealth exists that it is possible to consider its redistribution. The idea of security as an obligation of the state can exist only in a country that has through generations of adherence to the opposite point of view, produced a great abundance of goods and services.

Businessmen have an important role to play if they are to preserve and improve this system which has brought abundance to our people. They must, first of all, be conscious of their own responsibilities. The search for new and better products, for greater economy and efficiency in manufacturing, for wider areas of distribution, must be diligent. Progress halts when we are content with what we have.

It is also essential for business to observe its own fundamental rules. In a free economy, the rewards of invention and efficiency must be shared among owners, workers and buyers. Short-sightedness or greed, as reflected by the insistence of any of these groups to profit at the expense of, rather than along with, others, can be disastrous. Far more beneficial is cooperation and mutual understanding.

Businessmen are busy, as the name implies. But too often in the past they have been so wrapped up in their own problems, so intent upon business affairs, as to give the impression that they lack interest in the general welfare. Their critics have exploited the tendency of business groups to take a negative approach toward questions of widespread public interest. Surely the ingenuity which conceived mass production and accomplished atomic fission is capable of offering responsible alternatives to unsound schemes.

Give Them the Facts

It is equally important for business to emerge from its shell of reticence. Public misunderstanding of business methods and motives, of how business operates and what it has accomplished for the people, has been assiduously cultivated by Socialists and their political allies. If we give the people the facts, they can be trusted to make the right decisions.

We have recently received assurance of a changed attitude on the part of our administration in Washington. President Eisenhower pointed to the basic fabric of our economy in his State of the Union message when he said:

"We are concerned with the encouragement of competitive enterprise and individual initiative precisely because we know them to be our nation's abiding sources of strength."

In this country we have an economic system that has produced abundance for all of our citizens. We realize its imperfections and we have the will to improve it. But improvement does not mean that we must abandon that which is useful. It means simply that we must go on without turning our backs upon the fundamentals that have been proven sound.

The problem is not just one of political change. It is something that goes far deeper. It is a question of reaffirming the high moral standards to which we have held so strongly for so many years. It is a question of re-examining our faith in our republic, and in the principles on which it is based.

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Three-way diaphragm motor valve with single disc, double seat, commonly used on flow diversion work.

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LEADS THE INDUSTRY IN RESEARCH FOR BETTER PRESSURE CONTROL

Service Guide for

INVERTED BUCKET STEAM TRAPS

By Armstrong Machine Works

MORE inverted bucket steam traps than any other type are used in industry. Their popularity is due to reliability, simplicity, and high capacity in a compact design.

Dollarwise, steam traps are a small part of a plant. As such they sometimes do not receive attention in proportion to their importance to plant operation, efficiency and economy. A good trap in good working order and properly sized for its application does much to keep production high. Conversely, a faulty or improperly sized trap can lower production, sometimes by a sizeable percentage.

While some of the information in this Guide can be more specifically applied to Armstrong Steam Traps, most of it is of a general nature and applies to any inverted bucket trap.

PART I. HOW TO INSTALL TRAPS

1. **BEFORE INSTALLING.**
   a. Clean lines by blowing down at full steam pressure.
   b. Be sure trap is right one for the job. Trap size and maximum working pressure should be indicated on trap.
   c. Read following paragraphs 2 through 13.

2. **TRAP LOCATION.** Install according to these rules:
   a. Below drip point whenever possible.
   b. Close to drip point.
   c. Accessible for periodic inspection.

3. **TRAP HOOK-UPS.** For low and medium pressure service see Fig. 1 through 10. For high pressure traps, follow Power Piping Code for Drips and Drains.

4. **DIRT POCKETS.** Fig. 1, Fig. 7. Excellent for stopping scale and core sand. Clean periodically.

5. **STRAINERS.** Fig. 1. Install where specified or where dirt conditions are bad. Seldom needed with larger sizes of traps.

6. **BY-PASSES.** Fig. 5 and 8. Keep valves above trap to prevent a leaky valve from causing trap prime loss. Use only where essential for continuous service.

7. **ELEVATED TRAPS** require water seal and/or check valves. Fig. 9.

8. **TEST VALVES** (Fig. 1, 2, 7) provide best means of checking trap operation. Use petcock or small globe valve. Provide check valve or shut-off valve in discharge line to isolate trap while testing.

9. **CHECK VALVES** frequently needed. Fig. 10 shows three possible locations for eternal check valves—also an internal check valve. Recommended locations given in paragraphs 10 and 11.

10. **DISCHARGE LINE CHECK VALVES** prevent back flow from return line and isolate trap when test valve is opened. Normally install at location B, Fig. 10. When return line is elevated and trap is exposed to freezing conditions, install check valve at Location A.

11. **INLET LINE CHECK VALVES** prevent prime loss if pressure may drop suddenly or if trap is above drip point. An internal check valve in trap body, Location D, Fig. 10 is recommended. If swing check is used, install at Location C.

12. **PROTECTION AGAINST FREEZING.** Outdoor traps should be protected against freezing. Keep the discharge line short and pitch down from trap. If the trap is used intermittently, install an automatic thermostatic drain, or install a manual drain valve at the bottom of the trap. Traps can also be protected by insulation.

13. **STARTING TRAPS.** Turn steam on slowly to make sure trap catches prime. If in doubt, remove test plug and fill body with water. (All inverted bucket air traps must be primed by filling with water before starting.)

PART II. PREVENTIVE MAINTENANCE

A. Testing Schedule.

14. For maximum trap life and steam economy, a regular schedule should be set up for trap testing and preventive maintenance. Trap size, operating pressure and importance determine how frequently traps should be checked, as follows:

15. **HIGH PRESSURE TRAPS.** 250 lb and up. In well-managed central stations and industrial power plants, trap operation is checked anywhere from daily to weekly.

16. **MEDIUM PRESSURE TRAPS.** 60 to 250 lb. Test weekly to monthly.

17. **LOW PRESSURE TRAPS.** One to 60 lb. Test monthly to annually. Large 1¼ in. to 2 in. traps on water heaters and other high capacity jobs can be tested more frequently to good advantage.

B. How To Test.

18. **TEST VALVE METHOD IS BEST.** Figs. 1 and 7 show correct hookup, with shut-off valve in return line to

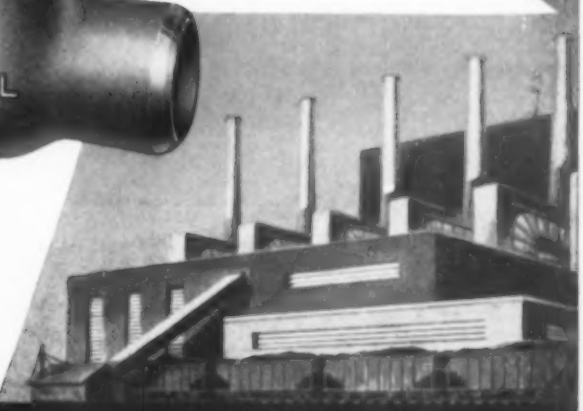
To know how good valves can be, install valves that are known to be good

Fig. 19003 W. E. 900-pound Cast Steel Pressure Seal Gate Valve with welding ends. A Powell design for the modern Power Plant. Also made for 600, 1500, 2500 pounds W.S.P.

DEPENDABLE VALVES SINCE 1846

If you already have Powell Valves in your lines, you are enjoying flow control at its best. But possibly you have never tried valves engineered to meet specific service conditions under which they must operate. To find out how good valves really can be, install Powell.

The Wm. Powell Company
Cincinnati 22, Ohio



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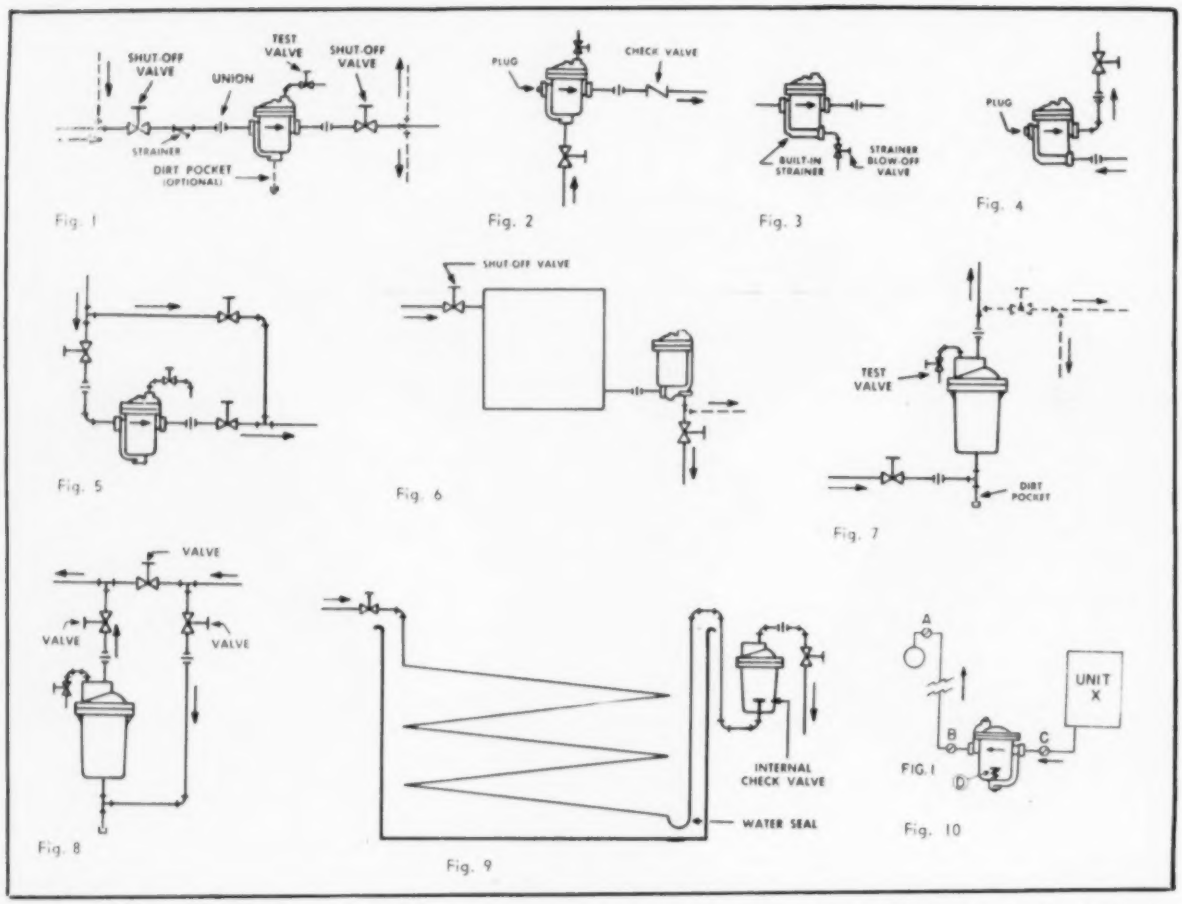


Fig. 1—Standard hook-up for side inlet-side outlet traps. Shut-off valves isolate trap during testing, inspection or repair.

Fig. 2—Alternate hook-up for side inlet-side outlet trap with inlet on bottom.

Fig. 3—Strainer blow-off valve on trap with integral strainer.

Fig. 4—Alternate hook-up for trap with integral strainer.

Fig. 5—By-pass hook-up for side inlet-side outlet trap.

Fig. 6—Hook-up for side inlet-bottom outlet trap. (Shows how shut-off valve head of unit can serve as shut-off for trap.)

Fig. 7—Hook-up for bottom inlet—top outlet traps.

Fig. 8—By-pass hook-up for bottom inlet-top outlet trap.

Fig. 9—Elevated trap hook-up.

Fig. 10—Possible check valve locations. See paragraphs 9, 10 and 11.

isolate trap from return header. Here is what to look for when test valve is opened:

a. **Intermittent discharge**—trap is okay.

b. **Flash Steam**—do not mistake this for a steam leak through the trap valve. Condensate under pressure in the trap holds enough heat to "flash" some of the condensate back into steam when released to atmospheric pressure. Flash steam is "lazy" steam and is normal.

c. **Dribble or semi-continuous discharge**—trap is okay. This type of discharge is caused by air mixed with steam or a light condensate load.

d. **Continuous Steam Blow**—trouble. Refer to paragraph 35.

e. **Continuous Condensate Flow**—trouble. Refer to paragraph 36.

f. **No Flow**—possible trouble. Refer to paragraphs 33 and 34.

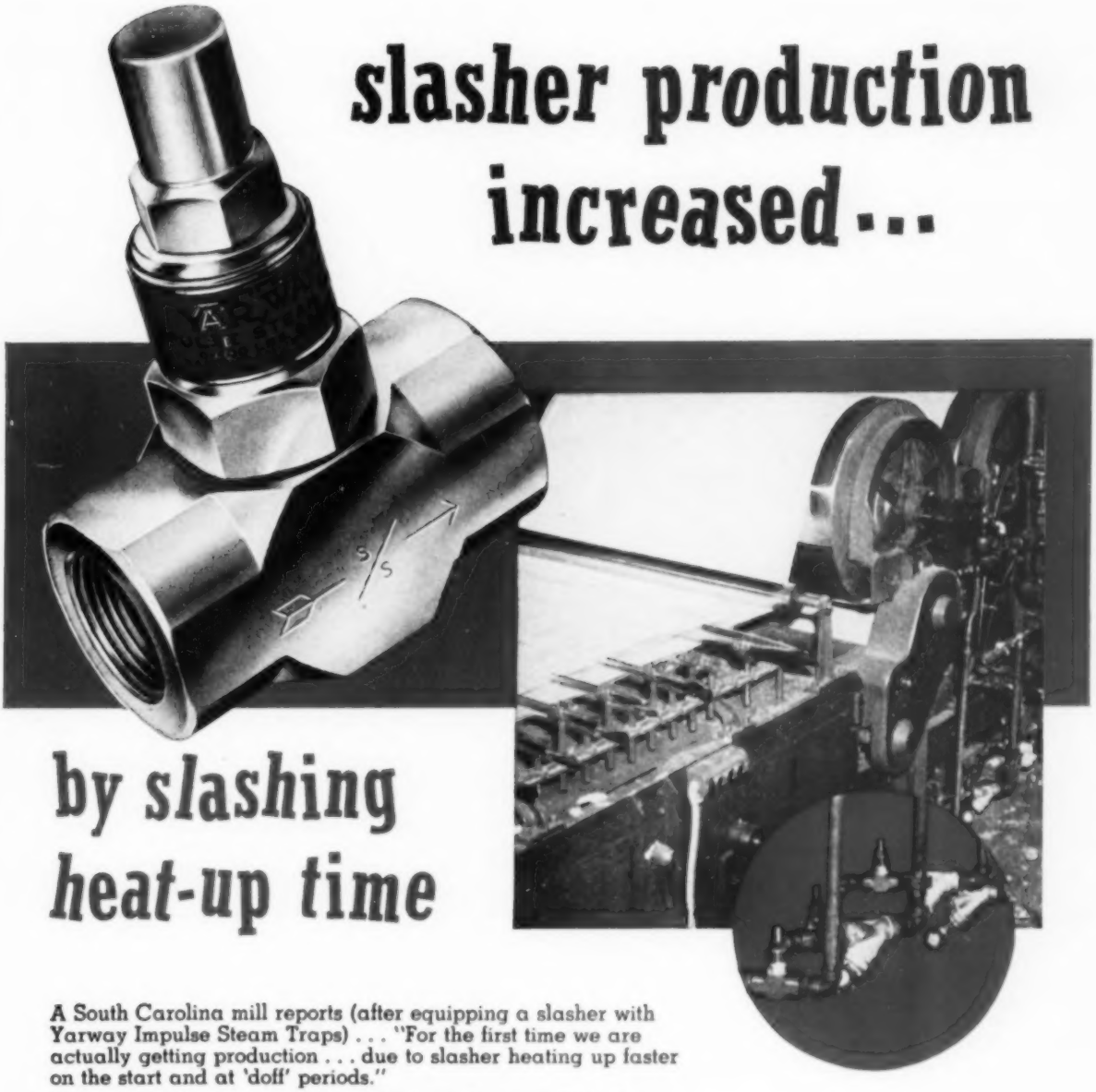
19. **PYROMETER METHOD OF TESTING.** First, file a clean spot on both inlet and discharge lines. If temperature of trap is at or near true steam temperature and temperature of trap discharge is at or near temperature corresponding with steam pressure in common return line, trap is okay. Intermittent discharges can be detected by rise and fall of needle on pyrometer when thermocouple is contacting discharge line. If discharge line temperature is nearly as high as trap inlet temperature, trap is blowing through. See paragraph 35.

20. **LISTENING DEVICE TEST.** Hold one end of a steel rod against trap cap and other end against ear. Intermittent discharges clearly can be heard. Excessive rattle indicates loss of prime. Considerable experience is required for this method of testing since other noises are telegraphed along the pipe lines.

21. **GLOVE METHOD TEST.** Put on a pair of canvas gloves and put one hand on inlet line and other on discharge line. A big difference in temperature will quickly be apparent indicating proper trap operation. Equalized temperatures suggest prime loss.

22. **INVERTED BUCKET AIR TRAP OPERATION.** There is an intermittent air loss through an inverted bucket trap draining water from compressed air. This is the air that passes through the small vent in the top of the bucket and amounts to approximately 7 cu ft of free air per hour. When the trap has a lot of water to handle, the air loss is materially reduced. All inverted bucket air traps must be primed before starting. See paragraph 13. More →

slasher production increased...



by slashing heat-up time

A South Carolina mill reports (after equipping a slasher with Yarway Impulse Steam Traps) . . . "For the first time we are actually getting production . . . due to slasher heating up faster on the start and at 'doff' periods."

This same mill also reports *even temperatures* on their dry cans — only 2° or 3° variance — compared to as much as 15° with the old-type traps. They are now standardizing on Yarway Impulse Traps.

Cases of increased production are common where Yarway Impulse Steam Traps are used. They are designed to insure sending maximum premium B.T.U.'s at top temperatures into your process or product . . . to *get equipment hotter, sooner and keep it hot.*

Enjoy these benefits, and others like *easy installation, reduced maintenance* and *low cost,* by trying Yarway traps in your plant. Stocked and sold by 216 Industrial Distributors. Trained Yarway men also are quickly available to help on your trap problems.

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the steam trap designed with more production in mind

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PART III. INSPECTION AND REPAIR

23. **FREQUENCY.** All traps should be opened at least once a year to check operating mechanism.

24. **VALVES AND SEATS.** If the valve seat has a sharp smooth edge, and if there is a narrow bright ring all the way around the valve, chances are that the valve is tight. Valves and seats that have become wire drawn or badly grooved from wear should be replaced. Do not use a new seat with an old valve or vice-versa. Reason: Valves and seats are factory-lapped together in matched sets for perfect fit.

25. **BUCKETS.** Cracked or corroded buckets should be replaced.

26. **THERMIC BUCKETS.** Hold over steam jet or lighted match to see that disc seats properly when bi-metal strip is heated. These thermic strips are replaceable.

27. **DIRT IN TRAP.** Remove all sediment and other dirt from the trap body. The mechanism may require cleaning by immersing in gasoline or kerosene. If there is an exceptional amount of dirt, install a strainer ahead of the trap. The strainer will have to be blown down or cleaned at periodic intervals.

28. **BY-PASS VALVE INSPECTION.** If traps are installed with a by-pass, it is highly important that the by-pass valve be checked to make sure it is perfectly steam tight. If the trap can be operated without the by-pass by all means remove it. Avoid the practice of opening by-pass valves and leaving them open.

29. **CHECK VALVE INSPECTION.** Make sure that check valves ahead of trap, in trap, or in return line, are tight and in good condition.

30. **PRESSURE CHANGES.** Some traps can be modified to operate at pressures other than specified. Pressure change assemblies are required. Get manufacturer's recommendations.

PART IV. TROUBLE SHOOTING

31. The following summary will prove helpful in locating and correcting nearly all steam trap troubles. Many of these troubes are in reality system troubles rather than trap troubles.

32. When a trap fails to operate and the reason is not readily apparent, the discharge from the trap should be observed. If the trap is installed with a test outlet, this will be a simple matter—otherwise, it will be necessary to break the discharge connection.

33. **COLD TRAP—NO DISCHARGE.** If trap fails to discharge condensate, then:

a. Pressure may be too high.
   1—Wrong pressure originally specified.
   2—Pressure raised without installing new pressure change assembly.
   3—Pressure regulating valve out of order.
   4—Pressure gage in boiler reads too low.
   5—Orifice enlarged by normal wear.

b. No water or steam coming to trap:
   1—Stopped by plugged strainer.
   2—Broken valve in line to trap.
   3—Pipe line or elbows plugged.

c. Worn or defective mechanism. Repair or replace, as required.

d. High vacuum in return line. Increases pressure differential beyond which trap may operate. Install correct pressure change assembly for pressure differential encountered.

e. Trap body filled with dirt. Install strainer or remove dirt at source.

f. Bucket vent filled with dirt due to oil or other water conditions. Prevent by:
   1—Installing strainer.
   2—Enlarging vent slightly.

34. **HOT TRAP—NO DISCHARGE.**

a. No water coming to trap.
   1—Trap installed above leaky by-pass valve.
   2—Broken or damaged siphon pipe in siphon drained cylinder.
   3—Vacuum in water heater coils may prevent drainage. Install a ¼ in. check valve as vacuum breaker between steam admission valve and coil.

35. **STEAM LOSS.** If the trap blows live steam, trouble may be due to any of the following causes:

a. Valve may fail to seat.
   1—Piece of scale lodged in orifice.
   2—Worn valve parts.

b. Trap may lose its prime.
   1—If the trap is blowing live steam, close the inlet valve for a few minutes. Then gradually open. If the trap catches its prime, the chances are that the trap is all right.
   2—Prime loss is usually due to sudden or frequent drops in steam pressure. On such jobs, the installation of a check valve (paragraph 11) is called for, and, if possible, locate the trap well below the unit or line that it drains.

36. **CONTINUOUS FLOW.** If the trap discharges continuously, check the following:

a. Trap too small.
   1—A larger trap, or additional traps should be installed in parallel.
   2—High pressure traps may be used for a low pressure job. Install right size of pressure change assembly.

b. Abnormal water conditions.
   1—Boiler may foam or prime, throwing large quantities of water into steam lines. A separator should be installed or else the feed water conditions remedied.

37. **SLUGGISH HEATING.** When trap operates satisfactorily but units fail to heat properly:

a. One or more units may be short-circuiting and the remedy is to install a trap on each unit.

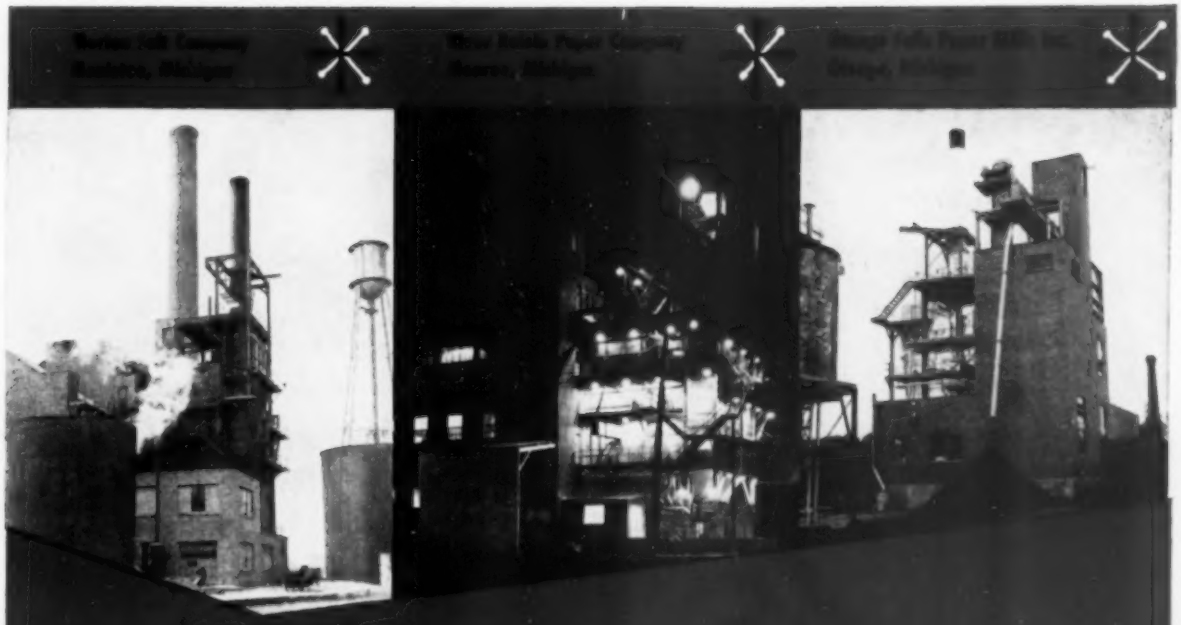
b. Traps may be too small for job even though they may discharge intermittently. Try next size larger trap.

c. Trap may have insufficient air-handling capacity. Use of thermic buckets may help. Where thermic bucket is not recommended, larger than standard bucket vents will speed up heating.

38. **MYSTERIOUS TROUBLE.** If trap operates satisfactorily when discharging to atmosphere, but trouble is encountered when connected with return line, check the following:

a. Back Pressure may reduce capacity of trap.
   1—Return line too small (Trap hot).
   2—Other traps may be blowing steam (Trap hot).
   3—Atmospheric vent in condensate receiver may be plugged (Trap hot or cold).
   4—Obstruction in return line (Trap hot or cold).
   5—Excess vacuum in return line (Trap cold).

39. **IMAGINARY TROUBLES.** If it appears that steam escapes every time trap discharges, remember: Hot condensate forms flash steam when released to lower pressure, but flash steam usually condenses quickly in the return line. See paragraph 18-b.



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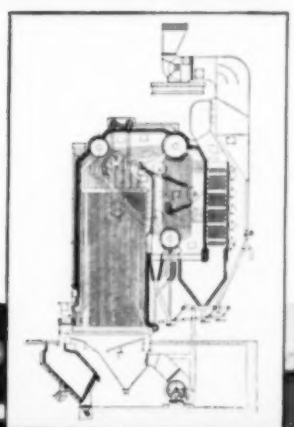
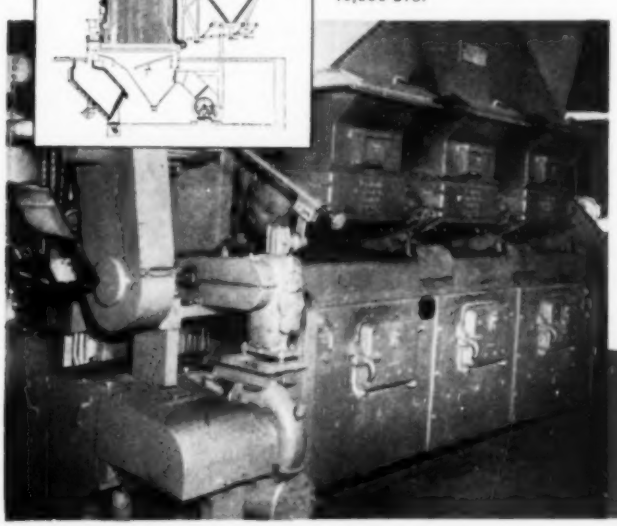


AT OTSEGO

75,000 pound unit with superheater and economizer. 650 pounds pressure 750° F steam temperature. Based on Ohio Strip Mine coal—10,800 BTU.



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DIESEL ENGINES

Maintenance suggestions on

Fuel Injection and Piston Rings

By R. W. HOYT, Chief Engineer, Double Seal Ring Co., Fort Worth, Texas

Fuel injection equipment and piston rings, located near the heart of the diesel, probably have more to do with efficient operation than any other component.

TO A FEW, the first indication that a diesel engine needs maintenance is when it stops running. To most of us, proper maintenance of the diesel engine is a realized necessity in varying degrees.

Today, we hear of the possibility of turbines or even atomic powered engines replacing the diesel. However, this is far enough away that we should spare no effort to concentrate on establishing a maintenance program that will keep our present diesel engines in doing their jobs day after day.

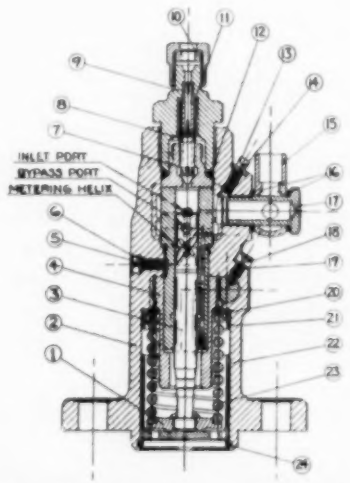
Preventive maintenance, progressive maintenance, and economic maintenance are terms we hear kicked around today. Whatever you call it, maintenance of operating equipment is an American tradition and we all know that in the end, it saves us money.

A true practical discussion of diesel engine maintenance could only be told in a complete volume so we will confine ourselves here to a few specific items such as piston rings and fuel injection equipment.

Fuel Injection

The fuel injection equipment in your engine is made with the greatest care and the closest clearances and tolerances that are possible even in this precision conscious day. There are three fundamental close fitting assemblies in each fuel injection system that have to be right to have your engine operate properly: (1) the plunger and barrel assembly and (2) the delivery valve assembly and, (3) the nozzle assembly. Each of these mating parts is vitally important in the proper operation of your diesel engine and each of them must be kept absolutely clean.

Probably the biggest enemy of fuel injection equipment, is dirt. We're not talking about dirt as you usually know it, but about very small particles of foreign matter which can get between the mating parts of the assemblies and cause improper working, seizing and galling. You have probably thought that this "cleanliness campaign" in handling fuel injection equipment was just a theoretical idea that was greatly overdone. Actually, such small things as lint off a cleaning cloth can plug up holes in your nozzles and cause improper spray distribution and resultant acting-up of your engine.



Typical fuel injection pump—(3) Plunger and Barrel Assembly; (7) Delivery Valve Assembly; (12) Delivery Valve Gasket; (13) Air Bleed Screw.

Some of the warning signals that your fuel injection equipment is not working properly are:

1. Speed of engine drops slowly and exhaust smoke becomes darker.
2. Engine noises increase indicating missing and unbalanced load.
3. One cylinder does not start firing properly when starting your engine.
4. Excessive and frequent lifting of the cylinder relief valve.

The first move to make when trying to correct any of the above complaints is to bleed the fuel injection pump and nozzle holder of any air that might be in the system. This

(*Continued on page* 99)

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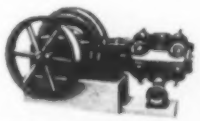
WIDE RANGE OF APPLICATIONS

. . . with unusual flexibility of drive and cylinder arrangements

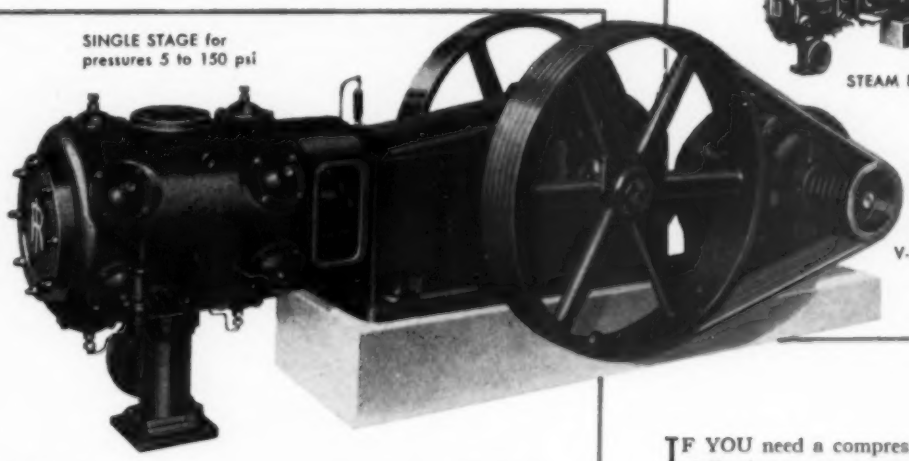
OVERHEAD MOTOR



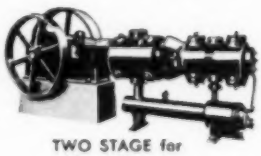
DIRECT-CONNECTED SYNCHRONOUS MOTOR

STEAM DRIVE

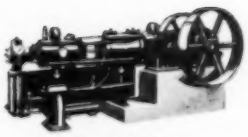
SINGLE STAGE for pressures 5 to 150 psi



V-BELT DRIVE

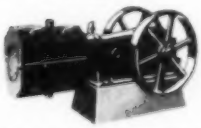


TWO STAGE for 150 to 500 psi

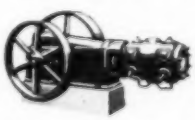


THREE STAGE for 500 to 2500 psi

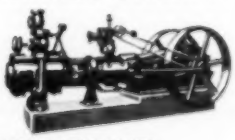
DRY VACUUM PUMPS . . . single or two stage



STEAM-PRESSURE BOOSTERS



NON-LUBRICATED CYLINDERS for oil-free air or gas



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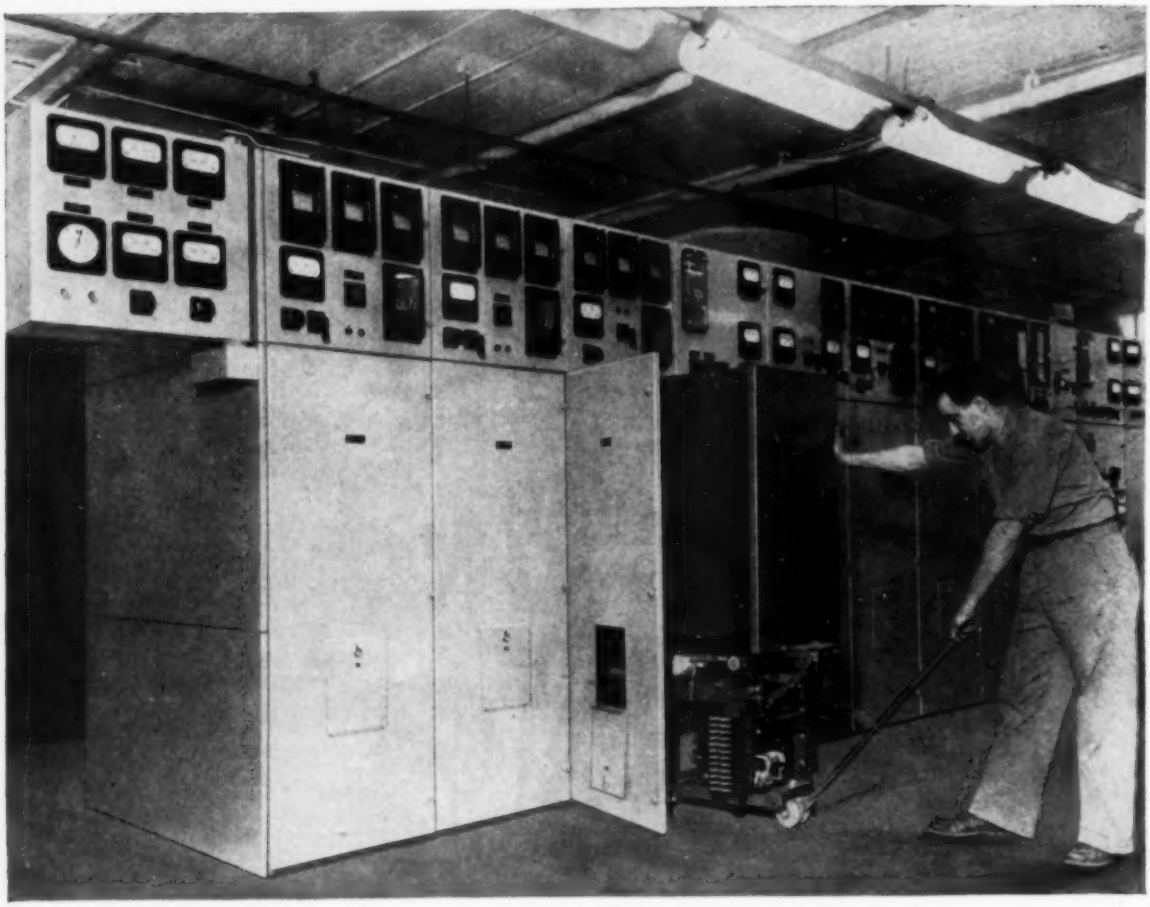
I-T-E Horizontal Drawout Switchgear



I-T-E Metal-Clad Switchboards complement latest engineering advances with neat, modern design. HV circuit breakers are easily withdrawn from compartments. Safety is the keynote.

Indoor and outdoor equipment in ratings: 4160 volts—50,000, 150,000, and 250,000 KVA interrupting 600, 1200, and 2000 amperes continuous

20 years and more of easier handling

Modern switchboards last 20 years or longer. During this period, you can expect periodic inspections, load changes, certain maintenance, and, of course, short circuits and overloads.

Consider the outstanding advantages to yourself of I-T-E *horizontal drawout* switchgear over the life of the equipment in each of the following instances:

When inspections are made

Truck-mounted circuit breakers can be wheeled out of compartments quickly and easily. Safety shutters isolate "live" contacts in the compartment. Connected equipment can then be examined carefully without danger to personnel.

When loads change

Relay settings are quickly adjusted to compensate for load changes. On wider load variations, current transformers may be changed. Isolation of compartments in Metal-Clad construction permits these changes without interference with the main bus. Circuit breakers may be removed from their compartments to assure complete safety. Horizontal drawout circuit breakers in drawout switchboards make this possible and *convenient*.

When maintenance is performed

Each circuit breaker is withdrawn from switchboard, checked, and adjusted if necessary. Service continuity is assured. While the circuit breaker is out of service, a spare can be used to replace it. One spare circuit breaker provides adequate insurance for many feeder circuits.

Your local I-T-E sales engineer will be glad to show you the specific advantages of Horizontal Drawout Switchgear in your own application. Or for complete details on I-T-E Metal-Clad Switchgear, send for Bulletin 7004-B, Dept. SP, I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.

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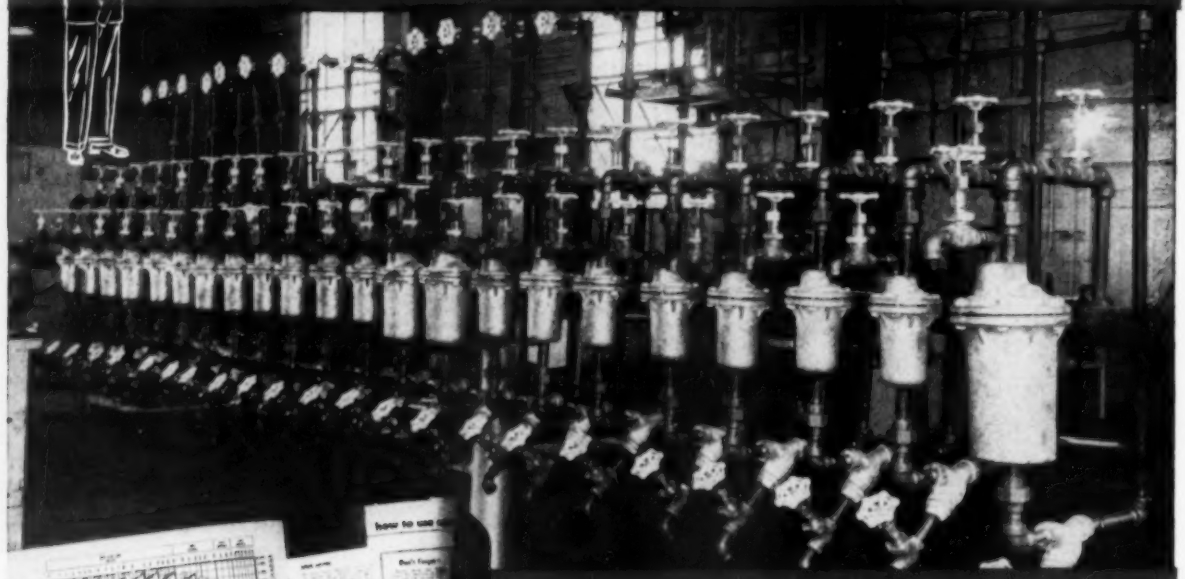

THE most carefully calculated installation of steam-heated processing equipment will fail to deliver full output if the steam traps do not have adequate condensate and air handling capacity. When this happens an important part of the capital investment in plant and equipment is wasted.

After you have figured the amount of steam that will be condensed, you need data on:

Condensate Capacity—not theoretical, not estimated, not cold water, but actual test findings with traps discharging condensate at steam temperature.

Trap Capacity Safety Factors, or ratio between continuous discharge capacity and actual amount of condensate to be handled. These may run from a low of 2 to 1 or as high as 8 to 1. Armstrong data tells you just what safety factor to use to obtain adequate air venting capacity and maximum heat transfer.

Armstrong trap data helps you get traps "big enough" for the job, but not too big; assures you maximum operating efficiency; eliminates corrections after installation. For traps and trapping assistance call your local Armstrong Representative, or write:

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HERE'S AN EXAMPLE of the reliability of Armstrong data: Armstrong trap capacity figures are based on hundreds of tests with condensate at steam temperature. The choking effect of flash steam through the orifice as well as the back pressure created by flash steam were automatically taken into account. Actual backups were used to allow for the effect of pipe friction.

If the capacity ratings had been based on cold water tests, which produce no flash steam they would be too high. Orifice test ratings are too high because they ignore the effect of pipe friction. Slide rule calculations of trap capacities have never been conservative.

When you see Armstrong Data and specify Armstrong traps you know that you are getting the right trap for the job.

SEND FOR the new 56-page Steam Trap Book—including 14 pages of data on how to size Traps for nearly every type of equipment. Free on request—no obligation.

ARMSTRONG STEAM TRAPS

Diesel Maintenance

(*Continued from page* 94)

is done by loosening the air bleed screws. Air in the lines can cause irregular firing.

Fuel Pump Troubles

If a fuel pump is not pumping the correct amount of fuel to the nozzle holder, there are three primary parts to check:

1. Plunger and barrel assembly.
2. Delivery valve assembly.
3. Delivery valve gasket.

The plunger and barrel assembly of your fuel pump is the heart of your engine. It is a precision piece of equipment and must be so treated. The clearance on diameter between plunger and barrel is approximately .00008". An interesting comparison of this clearance is made in assuming that you have a street 25 feet wide stacked for its full width with cigarette papers standing on edge and packed solid side to side. If you would remove two cigarette papers from this street full of cigarette papers, you would have an exact comparative relation to the clearance between the plunger and barrel of a large fuel pump. This is cited merely to emphasize the very small clearance available to accommodate any dirt.

Each of these plungers has been selected to fit a specific barrel. They must not be changed and put in another barrel. Plungers of defective pumps should be removed and examined carefully for score or gall marks. If a plunger or barrel is scored, it is best to replace the entire assembly with a spare. A plunger that has been examined and found to be O.K. should be cleaned in paint thinner, lubricated with spindle oil and re-assembled.

Delivery Valve

The delivery valve assembly is another mating part that must be absolutely clean. It has a close fit on diameter and an angular seat that must seal. This is a retraction valve and serves to dampen pressure surges, which cause irregular injection, in your fuel lines. Check the lapped surface of the delivery valve stem and the bottom of the delivery valve body. These can be re-lapped with fine lapping rouge if defects are found.

The delivery valve gasket is a simple, very inexpensive part which can cause a lot of trouble. It is simply a copper gasket that is expanded out to a fit by pressure between the delivery valve holder and the delivery valve body. About the only trouble experienced with this gasket is that it is subject to erosion. If your pump is leaking or not working properly examine the two tapered sealing surfaces of the gasket for small lines or apparent cracks in the surfaces. If these cracks are visible, then the fuel under high pressure is leaking by the gasket. The best remedy for this is to replace the gasket with a new one, but, in cases of emergency, it is possible to heat the gasket, annealing it, re-assemble it, and correct the trouble.

Nozzle Deficiencies

The function of the nozzle holder and nozzle assembly is to atomize or spray the fuel metered out by the fuel pump, into the combustion chamber at the proper time.

Two main troubles are experienced with the nozzle assembly.

1. Nozzle leaks or dribbles.
2. Spray orifices become plugged.

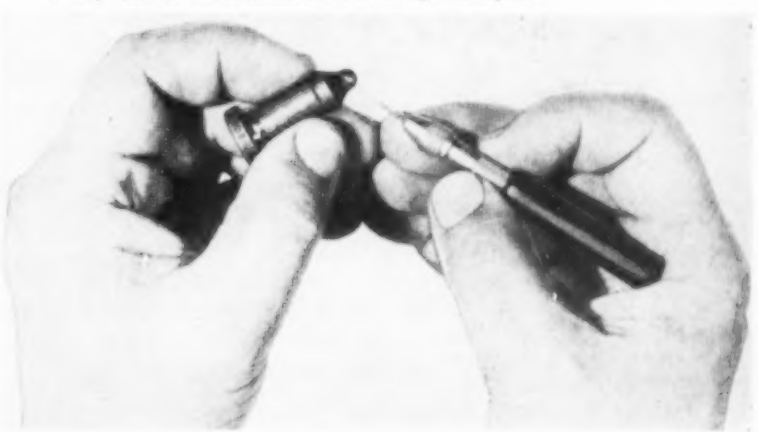
The nozzle assembly consists of a needle valve which is lapped to a fit with a nozzle body. The needle is a straight, long, small diameter body with a 60° valve seat on its lower end. If the nozzle leaks, probably dirt or some foreign substance has spoiled the needle seat. This can be lapped by using a very fine lapping rouge. In doing this it is essential to use a lapping mandrel that selectively fits the bore of the nozzle body. The lapping mandrel should be dressed on the end to exactly 60°. It is important that the needle contact the valve body seat at the large diameter of the tapered valve seat.

Spray holes, sometimes as small as .006" in diameter, plug rather easily with small particles of dirt passed by defective filters. After removing the spray nozzle or spray tip, first soak it in fuel oil or carbon-tetra-chloride. Remove all carbon by using a fine bronze wire brush and clean spray orifices with a very fine wire or with special cleaning needles. The cleaning of spray orifices is a delicate operation, requiring good light and preferably a magnifying glass. Cleaning needles must be inserted into the spray orifices very gently and should be rotated while being inserted. No attempt should be made to push these needles through the spray orifices when they are filled with hard carbon or dirt. If a spray nozzle can not be cleaned properly, it should be discarded. It is recommended that spare spray nozzles be kept available at all times.

After the pump and nozzle have been checked, cleaned, re-assembled and installed, it is necessary to balance the maximum firing pressures. These pressures vary with the compression pressures. They can be balanced by adjusting the beginning of injection. This is accomplished by re-adjustment of the fuel cam or tappet.

(*Continued on page* 100)

Spray holes, sometimes as small as .006" in diameter, plug rather easily with small particles of dirt passed by defective filters. Read "Nozzle Deficiency" section for recommended cleaning techniques.



Most engines are provided with exhaust pyrometers and an adjustable connection between the governor and the control rack of the pump. Control racks should be adjusted until exhaust temperatures are within 25 degrees Fahrenheit of each other. This insures that each cylinder is doing an equal amount of work.

Just a Few Inches Lower

Just a few inches lower than the tip of your spray nozzle is your top piston ring. Piston rings have two primary functions:

1. To seal the compression.
2. To distribute and control lubricating oil.

The economy of your diesel engine operation depends upon your careful selection, proper installation, and good maintenance of your piston rings.

Heat is Main Factor

We believe that if it weren't for the heat that piston rings are subjected to, they would slide up and down the cylinder wall almost indefinitely. The heat is there, however, and it must be put up with. One of the biggest problems for an operator to solve is: "When does an engine need maintenance?" As far as piston rings are concerned, we look for loss of power, difficult starting, use of excess fuel and lube oil to tell us that it is time to take the engine down. These faults can be caused by the following piston ring defects:

1. Compression rings worn so much that blow-by through the open gaps cause loss of power.
2. Broken rings.
3. Rings have lost their snap.
4. Oil rings worn beyond effective scraping action.

Some Causes of Troubles

1. Normal wear.
2. Excess wear due to overloading of engine, poor lubrication, severe operating conditions.
3. Defective rings.
4. Improper grades of fuels and lubricants.

It is difficult to set a specific regular period for taking down a diesel engine but in many cases, operators of heavy duty, stationary engines have set up a period of from 8,000 to 10,000 operating hours between major overhauls. Factors that affect determination of this period are:

1. Load factor.
2. Fuels and lubricants used.
3. Operators routine maintenance.
4. Type, size, and service of engine.

Things to Look For

There are numerous things to look for when taking an engine down to inspect the rings. The condition of the rings and liners will tell a story and if you interpret that story correctly, you will know which way to turn in order to eliminate your troubles. If your problem has been loss of power, look for these things:

1. Broken compression rings.
2. Rings not fully seated in on the face. You will still see some tool marks in spots on the face of the ring if the ring or liner is out of round. Compression rings can only seal an out-of-round cylinder if they wear to a fit. When they wear this much, the gap has usually opened up so much that blow-by exists at the gap. Best solution to this problem is to use a sealing type compression ring similar to the type illustrated.
3. Irregular groove seats permitting blow-by between the ring and seat.
4. Stuck rings.

It is important to make certain that all compression rings are free in the grooves.

If your problem has been excess lube oil consumption, you must look for the following things:

In any of the above cases of oil rings, it is best to replace with new oil rings. It is possible to remove compression rings, clean them and put them back in the same groove on the same piston but great care must be used to avoid "kinking" or over-stressing the ring during this operation.

New Type Oil Rings

There have been some really new developments in oil control rings in the past year. In fact, operators that used to be satisfied with oil consumptions of 2500 horsepower hours per gallon of lube oil, are now obtaining 6000 and 8000 horsepower hours per gallon of lube oil. Some even report better consumption than this but the figures haven't been confirmed.

The old method of obtaining better oil efficiency was to increase the tension of the ventilated oil ring by increasing the free gap and by increasing the radial thickness of the ring. As the free gap of the ring was increased, the manufacturing problem of producing a round ring was also substantially increased and the ring was likely to give better oil consumption but wear out faster.

Section of a new double acting, inner sealing tongue compression ring.

The new flexible oil ring with abutment type expanders are the perfect answer to cutting down oil consumption. In the first place, the radial thickness of the ring is reduced substantially and so is the free gap providing a ring which can be manufactured fully round rather easily. This also makes a ring that is very flexible. Then a special expander looking somewhat like Christmas ribbon candy in shape is cut a calculated amount too long to go inside the ring when the ring is closed to cylinder diameter. This causes the ends of the expander to butt together and compress accordion-like the individual loops of the expander.

This very stiff expander forces the ring into contact with the cylinder wall all the way around. This full cylinder contact reduces the wear on the ring while at the same time doing a superior job of controlling oil consumption. The expander is made of tempered spring steel which will never "wilt" and lose its tension. Performance results with these new oil rings are outstanding. If your problem is oil consumption, we suggest you investigate these rings.

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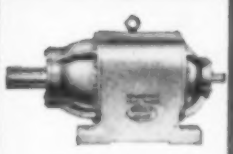
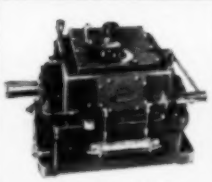
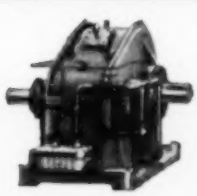
Spiral-Bevel Reducer



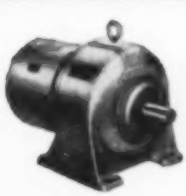
Planetary Reducer



Change Speed Unit



Speed Increaser



Gearmotor

Heavy Duty Worm

Steeple Type Worm

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Worm Gears up to 150" diameter. Worms to match.

Spur Gears up to 150" diameter. Larger gears in bolted sections.

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TRANSFORMER REFINISHING

Techniques for Air Cooled Transformers

Accumulated layers of paint retard radiation and offset efficient cooling. Here are plant tested techniques on how to restore air cooled transformers to good operating efficiency.

SINCE the war years many air cooled transformers have been operated beyond their engineered capacity. The necessary cooling has been obtained by applying streams of water on the fins or by providing fans or other ventilating equipment.

Multiple layers of accumulated paint tend to retard radiation and offset efficient cooling. To restore these units to their engineered capacities, excess paint should be removed and heavy deposits of paint should be eliminated in subsequent refinishing methods.

Stripping

Several methods of stripping are prevalent. Where steel is heavy, sandblasting has been found most satisfactory. Where transformers are constructed of thin, rolled sheets, chemical stripping has been found most efficient and products such as caustic soda and Oakite have been used most satisfactorily. The best and quickest results have been obtained where these solutions are used hot and flow over the old surfaces to remove the heavy paint and rust deposits.

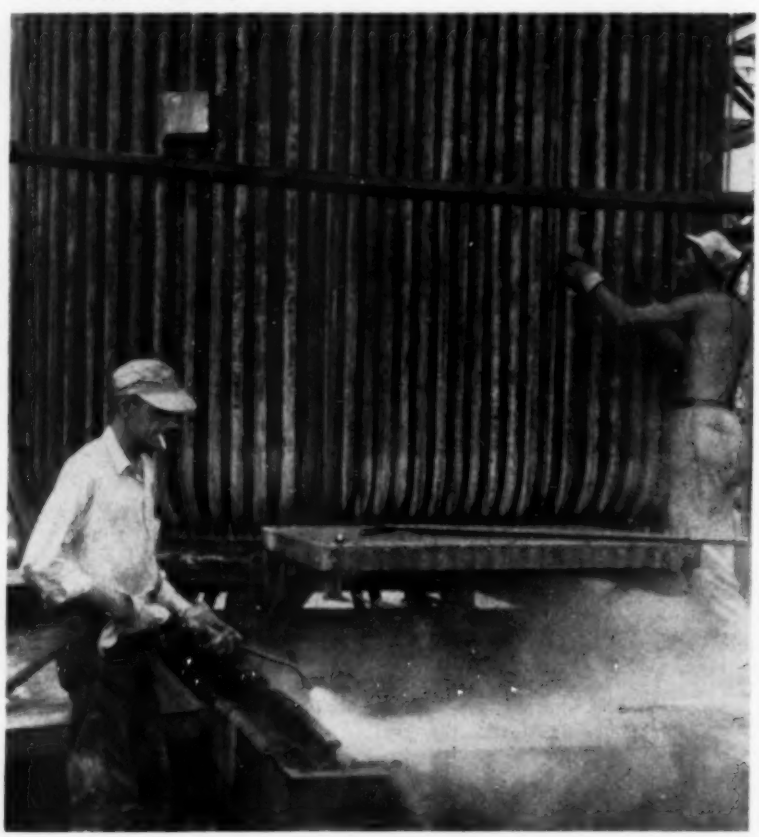
If sandblasting is used, high pressure air should follow the cleaning operations to remove all particles of sand and grit prior to painting and the paint should be applied as quickly as possible after cleaning so as to prevent a future build-up of corrosion.

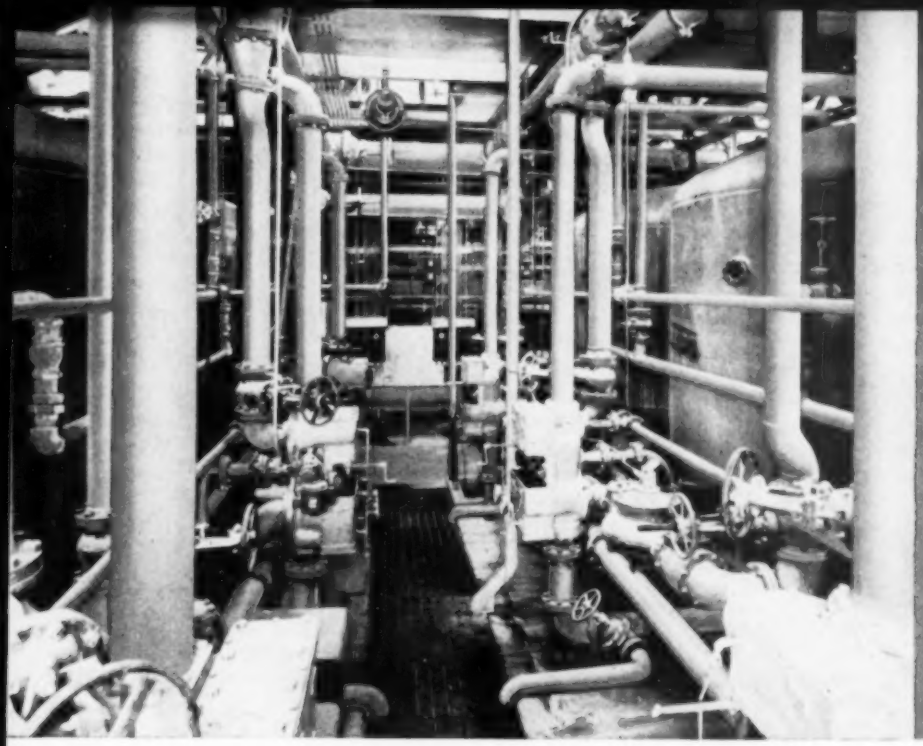
On tubular type transformers, chains may be used in a see-saw action to reach the inaccessible areas facing the transformer tank. Dental mirrors can be inserted between the tubes, or the fins to facilitate inspection of these less visible areas. Hand scrapers and mechanically driven wire brushes often facilitate the removal of paint and rust deposits where they are accessible.

Neutral Surface

Where chemical treatments are used, the removal of the chemical deposits is essential. This is done by flushing with high pressure water or steam, and should be followed by a neutralizing agent such as acetic acid to kill the activity of the paint remover prior to any future paint applications. In some places this acid is immediately

Steam cleaning and sand papering transformer after stripping off old paint. When chemical treatments are used, make sure surfaces are neutral before refinishing.





CAST IRON

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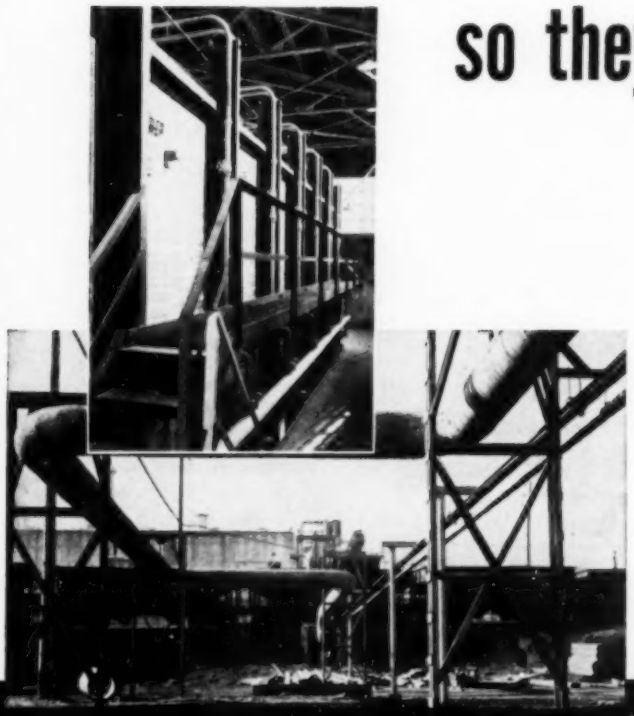
PLASTIC LINED

A critical piping job...

so they called in Blaw-Knox



Piping requirements for this "classified" processing plant were most unusual. To handle highly corrosive fluids, gas, steam, water and air called for a wide range of metals and fabricating techniques. Space limitations, too, complicated the installation, demanding extreme accuracy in contour and dimension.

Power Piping Division's superior plant facilities, exceptional field organization and top-notch experience accounted for . . . "a good job, well done."

BLAW-KNOX

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added to the steam jenny and works quite satisfactorily.

It is suggested that a litmus test be used to determine the neutrality of the surfaces prior to paint application. This can be done by merely pouring some distilled water over the fins and collecting it in a bucket and then testing this residue water with either a litmus solution or litmus paper. Spot checking with moistened litmus paper on the surfaces has not been found to give a representative reading of the total area, but this test does have some value.

After it has been determined that the surfaces are neutral they should be allowed to thoroughly dry. Sandpapering of the fins to remove remaining rust or dirt deposits is recommended, and any transformer oils which still remain should be thoroughly washed off with a suitable solvent. The units are then considered right for repainting.

Paint Selection

The selection of the proper paint is then very important. It should not be judged merely on its length of life, but also on a definite system so as to take care of future maintenance requirements and to minimize repainting and film build-up. The usual procedure has been to apply a priming coat, such as red lead or iron oxide, followed by an intermediate or body coat, followed by a high gloss enamel finishing coat. This three-coat system gives a long life, but builds up a film thickness of approximately five mils. When repainting is again demanded, the same three-coat system has often been used with the resultant heavy deposit of insulating paint on the cooling fins. When repainted often enough, the same problem of removing all old deposits is again confronted, and an expensive cleaning and repainting job is again demanded.

To overcome this dilemma only two coats of paint are recommended after stripping. These two coats should both contain the same basic pigment ingredients and compatible vehicles. The paint must be rust-inhibitive, must be hard and yet flexible to withstand temperature changes and expansion and contraction of the steel itself without peeling, chipping or cracking. It must resist transformer oils and cleaning agents. It must give a color and finish suitable for maximum heat radiation and company color systems. The paint should also present a good repaint surface for future maintenance coats, have a long life and yet wear away gradually so as not to build up the heavy, objectionable paint film deposit at any time. The film thickness should never exceed five mils regardless of the number of coats applied throughout the years.

Paints based on a pigment of lead-suboxide have all these characteristics and have proven their advantages over a period of twenty-five years. A primer based on lead-suboxide and normally gray in color can be shaded to either a dull green or dull red to give added contrast between the first and second coats, and to facilitate observation of wear. The second or final coat can be any of the various shades of grays, greens or aluminum type finishes. As both coats contain the same lead-suboxide pigment a uniform and an harmonious film is established. The two coats so applied result in a normal film thickness of approximately three mils and are found to give maximum radiation.

Through weathering the film gradually wears away and the contrasting color of the priming coat can be seen. At this time a single coat is ample to restore the film to its original thickness and efficiency. No stripping is required, and the only surface preparation necessary is to remove dirt and transformer oils prior to the application of this one maintenance coat. Obviously, considerable savings of labor, material and outages result.

Many companies have found this system of painting so economical and efficient that they specify a lead-suboxide paint when ordering new equipment. These specifications sometimes call for a priming coat only, followed by a field coat after delivery; or they call for a complete paint job which, however, is never composed of more than two coats. A periodic examination of all air cooled transformers to see that they are kept painted before corrosion or pitting can start, will create further economies and will further reduce service outages.

By T. J. Eberhardt, Vice President, Subox Inc., Hackensack, N. J.

Elevators and Controls

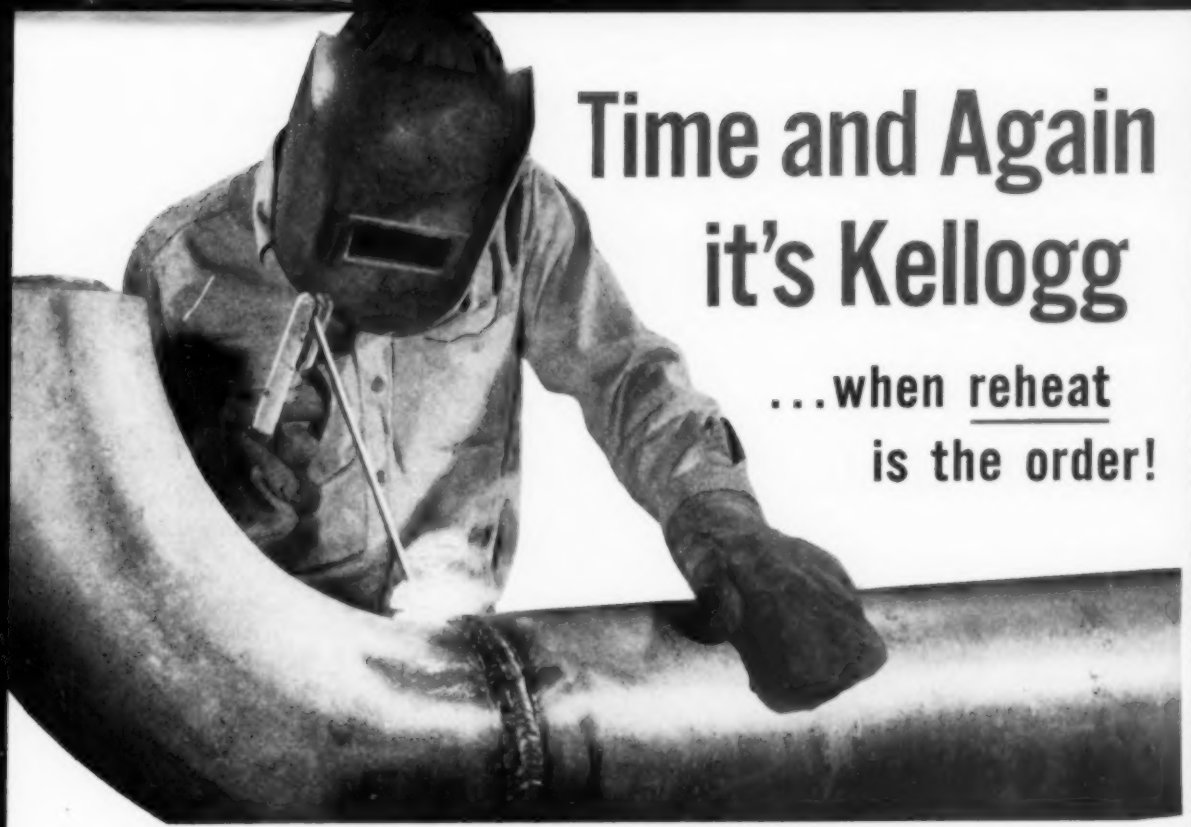
(*Starts on page* 70)

the armature and core face. If, due to prolonged use, the two outlet core-faces "pound-down" and the center core face touches the armature on a space no larger than a pinhead, it can cause a relay to stay closed or may retard a larger contactor or brake magnet so it will either drop out slowly or not at all.

A perfect core material would be one that retains absolutely no magnetism. There is no material that will retain this characteristic indefinitely, the steel experts tell us they all change with use and age. The remedy is to file or otherwise cut the center core face back to its original clearance.

The second point in design is that of overheating or burning out of coils. Some devices are designed to stand continuously across the line; to stand this service the core and coil must radiate heat as fast as it is generated within the coil. Relays and contactors are zero per cent efficient, because they do no work, this means all the electrical energy used to close and hold them sealed must be dissipated in the form of heat.

Devices that will stand intermittent duty may burn up on continuous duty. If they do burn up it is sometimes possible to reduce the current flowing through the coil to the point where it will not overheat. This is done by inserting a resistance tube in series with the coil winding—its limit of value will be determined by the lowest value of current that will hold the armature sealed without humming. Coils working on devices that "hum" will get hotter than they would be if there were no humming.



Time and Again it's Kellogg

...when reheat is the order!

WHY KELLOGG . . . particularly for reheat piping systems? There appear to be several factors responsible, all derived directly from the fundamentals of the reheat systems themselves.

Naturally, the *double* intake and exhaust turbine leads complicate these piping layouts . . . the higher temperatures employed increasing the need for accurate determination of stress and reaction values and the extra-careful positioning of restraints. Designers frequently have found Kellogg's unique model tester of considerable help in solving these problems. With it, they can pinpoint stress and reaction values and line deflections, change proposed layouts to meet their findings, and retest . . . *all in a matter of hours rather than days or even weeks.*

Then the elevated temperatures, which make these reheat systems economically attractive dictate the use of alloy steel piping. Here, utility company engineers well realize that experience and meticulous production methods are essential for fault-free installations. Kellogg's experience has two-fold interest to these purchasers.

First, Kellogg has specialized in high-temperature, high-pressure power piping for more than three decades, has installed the alloy main steam piping for more than 6¼ million KWS of output. During this period the company has in many cases led the way with research work to determine the most desirable steel analyses, bending and welding methods, heat treatment techniques and quality controls.

Second, in the field of alloy fabrication, Kellogg fabricated the first stainless power installation, establishing the heating cycles for welding and post-welding treatment . . . set the specs for the welding electrodes. Add to this innumerable other alloy piping installations in all branches of industry, including a current job for the AEC which alone involves the installation of over 25,000 tons of piping.

The total of this specific experience, when combined with active, continuous research and development work pointed toward further improvements in materials and fabricating techniques . . . are the basic reasons why **"Reheat power piping by Kellogg"** is so often the specification . . . *36 times within the current power expansion period.*

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- General Electric Co.
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DO A **BIG JOB** IN A **SMALL SPACE!**

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Two 44′ diameter Accelators treat 2800 gpm of Parana River water for clarification and color removal at a San Nicolas distillery in Buenos Aires. A portion of the treated water is used for boiler feed with supplementary treatment.

Elevated to provide gravity flow of clarified water to filters located over a clearwell, these Accelators provide water supply in a fraction of the space required by other types of water treating equipment.

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Maintenance Records

(*Starts on page* 73)

or every *last* piece used. If you are interested in listing the entire cost of all jobs, every item used should be listed. But if you are not interested in the cost of the material, it is not necessary to list it in such detail.

However, the major items should be listed as they will help on the maintenance. If a pump is having only normal bearing failure it can be considered average wear and replaced. If the bearing failure is frequent, it means the cause is not in the bearings, but may be misalignment, distortion, or other causes, which would have to be checked. It is of little use to replace a bearing if you do not correct the fault. This is but one case where good record of material used can simplify maintenance.

Parts Needed

A record of parts which should be replaced next overhaul will give the plant time to order any necessary parts and also to forewarn the maintenance man what he will find wrong next time he works on it.

A notation showing who did the work is helpful in case you have any question to ask later about the work.

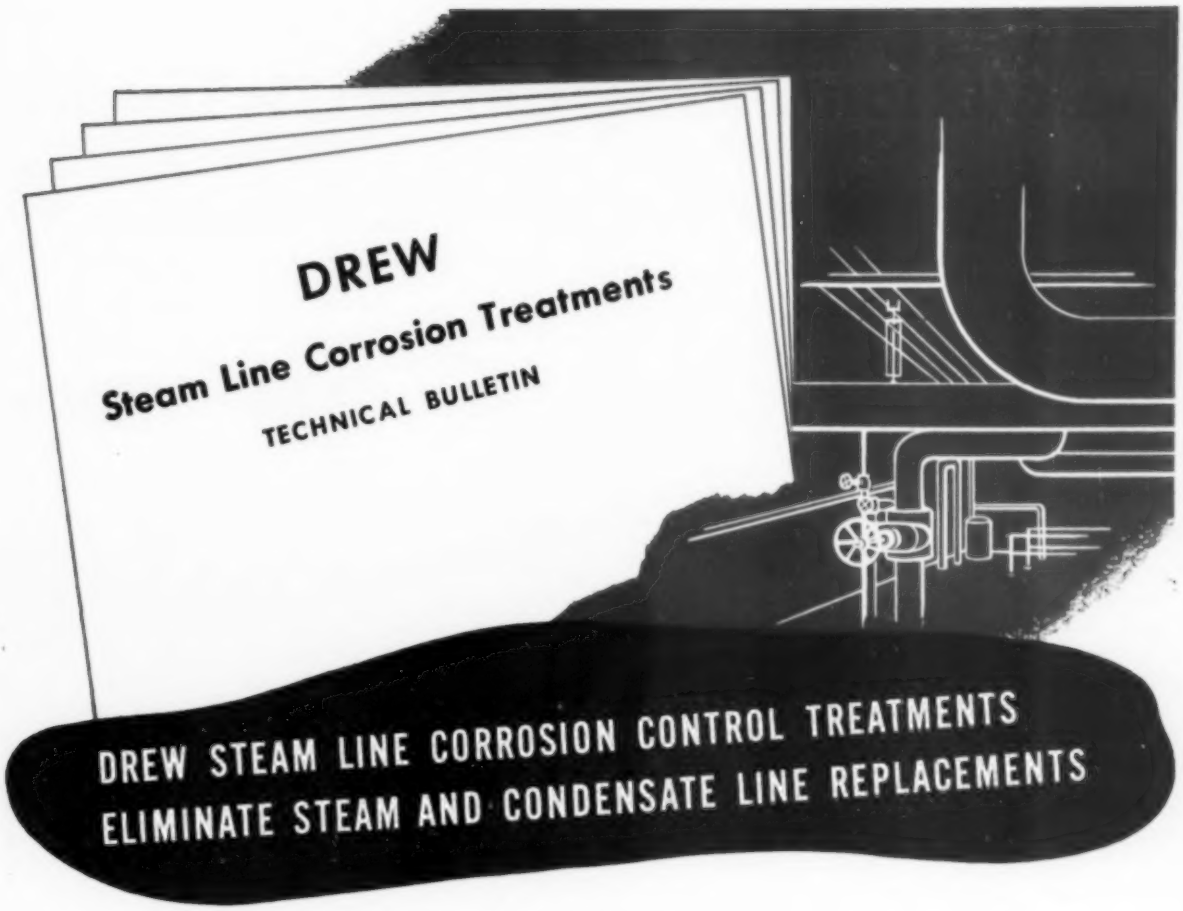
Costs

The cost of the job should actually be listed in two separate parts—1. Material costs. 2. Labor costs. This information is useful in showing where the money actually was spent.

Showing the hours used can be helpful if you ever have to estimate the cost of a similar job in the future. Using the man hours with your present labor rates, you can judge the labor costs on a similar job.

Simple and Specific

The first four items comprise the basic essentials of a maintenance record system. With these you can have a system running efficiently. The other items add to the use of the records. They also add to the work in keeping them. It is up to each to determine if the extra work is worth-while.



DREW STEAM LINE CORROSION CONTROL TREATMENTS ELIMINATE STEAM AND CONDENSATE LINE REPLACEMENTS

A leading food plant was constantly replacing condensate return lines that had failed. Drew Engineers determined the cause of failures to be carbon dioxide in the condensate.

For treatment, Drew SLCC was recommended. This is a non-toxic material which does not taint the food being processed in the plant. A volatile alkali, Drew SLCC corrected the condition quickly by neutralizing the carbon dioxide. In this plant, Drew treatment put an abrupt end to costly maintenance.

In other instances of steam and condensate line corrosion, Drew Products such as SLCC-Q and SLCC-A are used, depending upon conditions. To prevent or eliminate water problems in your plant, you'll get results faster and more economically with the Drew 5-point program

1. Thorough study and analysis of the problem
2. Use of effective organic and inorganic materials
3. Efficient methods of feeding materials to the system
4. Control of dosages by simplified plant testing
5. Qualified field supervision and technical assistance

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DREW PRODUCTS

Maintenance Program for Lift Trucks

By DON HOLM
Hyster Company

FOR THE MOST efficient and economical use of a fork lift truck, owners are beginning to recognize maintenance and service as being among the most important functions of their materials handling operations. An efficient operation depends upon an efficient truck and an efficient truck is one that spends a maximum time on the production line and a minimum of down time on the "deadline."

In large operations, where an extra truck or two can be rotated while others are serviced and repaired regularly, this is mostly a matter of adequate and efficient garage or maintenance department. In most operations, however, which means those jobs employing one to five trucks, emphasis is necessarily placed on *preventive maintenance* as the only practical way to keep the trucks in production longest. Preventive maintenance is largely the responsibility of the operator himself, and is most effective when operators are properly trained for the job.

The following can be considered good typical lift truck maintenance practices as followed by most of the progressive lift truck users in the country.

Inspection and Maintenance

A system of logging is generally used to keep record of all maintenance. Without regular checks and records of repair work done, a maintenance program is practically worthless.

Specific checks are made at the start of each shift and weekly, bi-weekly, monthly, semi-annually and annually thereafter for the life of the truck. These checks are so scheduled by a dispatcher or supervisor that they become routine and regular, and a master log is kept so that he can see at a glance that each truck is receiving continued proper care. Such system is also necessary for keeping accurate cost accounting records.

Daily check sheets or charts are kept attached to the truck for use by the operator. These are filled out by the operator at the start of each shift. Sometimes an inspector in the garage makes a daily examination of each chart or trip ticket turned in for each machine to discover any defect. This inspection also includes a check on the daily service the truck is receiving.

Truck Repairs

All repairs and servicing are done by qualified mechanics. *The lift truck operator is not permitted to make any repairs or adjustments to the machine.* His responsibility ends with properly filling out the check charts provided him and reporting defects.

Operator's Responsibility

Fork lift trucks are subjected to a continual pounding, often under severe conditions. Even in normal operation a lift truck is started, stopped, backed up, and maneuvered a hundred times or more during a shift. A trained operator will learn to keep these to a minimum and perform movements smoothly so that wear and tear is maintained at normal depreciation.

To prevent unusual wear and tear on a machine the operator should avoid such practices as jerky starting, racing engine, clashing gears, riding clutch, skidding, over-loading, excessive speed and other unsafe and damaging practices.

The driver should inspect his machine *before*, *during* and *after* operation.

He should immediately report to the supervisor any mechanical defect which would harm the machine if kept in operation.

He should fill out his trip ticket or check chart in detail and turn it in daily to his supervisor.

Operational Check List For Drivers

The operator should perform each of the following checks daily before beginning the shift:

1. **Check water muffler**—if truck is equipped with a water muffler the water level in this accessory should be checked and filled if necessary.

2. **Check tires**—pressure should be noted and tires inspected for cracks, breaks and wear. Remove any stones, glass or other imbedded objects.

3. **Check oil level**—pull saber and wipe with clean rag before inserting. Oil level should be between "low" and "full"—never over "full" or under "low."

4. **Check fire extinguisher**—shake to determine if filled. If seal is broken report it on chart.

5. **Check steering**—rotate steering wheel in both directions. Play should not exceed 1½ in. on outside of wheel. Look for any indication of binding or "lumpy" operation.

6. **Check fuel supply**—determine amount from gas gauge. In continued operation fill gas tank once during shift also. It is poor practice to operate a gasoline engine on a nearly empty gas tank.

7. **Check water in radiator**—remove radiator cap and observe water level. Water should be visible at base of filler neck. When radiator contains anti-freeze, do not add water if level is low. Notify supervisors. Check fan for proper operation.

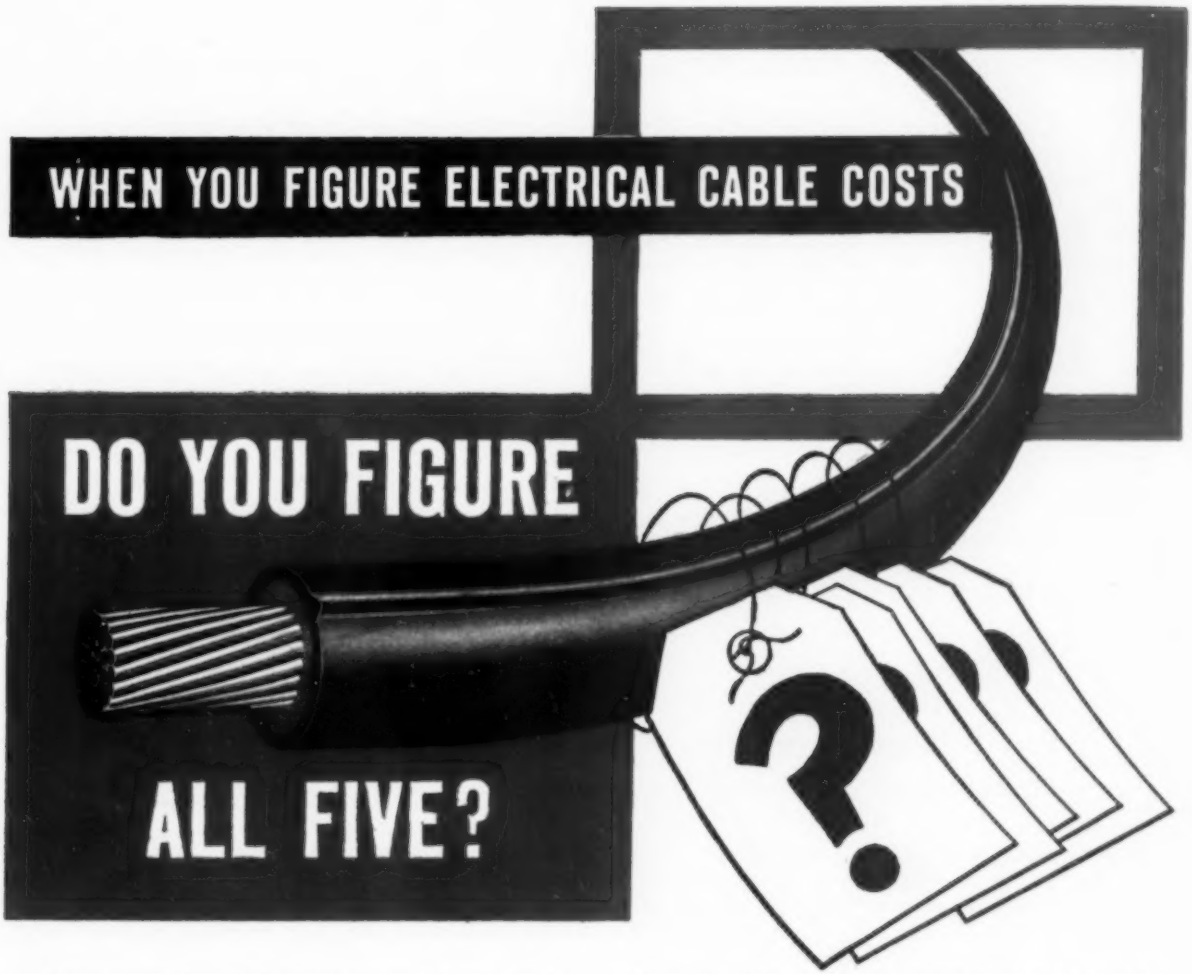
8. **Check horn**—test for operation and proper tone.

9. **Check starter**—start motor and observe operation of starter. Let motor idle.

10. **Check oil pressure**—gauge should show at least 10 lb minimum pressure or 25 lb maximum. If under 10 lb

WHEN YOU FIGURE ELECTRICAL CABLE COSTS

DO YOU FIGURE



ALL FIVE?

All too often electrical cables are purchased solely on the basis of initial cost. Actually, of course, this is only one of five factors to consider . . . and no true cost comparison can be made until the four "hidden" costs are figured.

Here are the four "hidden" costs which often upset your overall budget, particularly when you're trying to "economize":

- **installation costs**
- **maintenance costs**
- **costs of power shutdowns when a cable fails**
- **costs of replacing a cable which has failed prematurely.**

Okonite cables are the most effective means for combating these costs. A wide range of Okonite cable designs assures you of the most economical installation for any type of operating condition. And for savings throughout the life of the cable, Okonite always uses the premium materials and exclusive processing techniques which deliver unfailing electrical service year in and year out.

We can't condense millions of man-hours of cable research, field engineering and manufacturing experience into a short description of Okonite cables. But your Okonite representative can show you in black and white why the best cables – Okonite cables – really carry the lowest overall cost. The Okonite Company, Passaic, N. J.

The best cable is your best policy

OKONITE SINCE 1878 *insulated wires and cables*

or over 25 lb stop motor and report to supervisor.

11. **Check engine**—speed up engine gradually and listen for any unusual noises. If they occur report at once to supervisor.

12. **Check ammeter**—if battery is fully charged, reading should show charge for short period, then return to slightly above zero. If battery is low, meter will show longer charging time.

13. **Check oil pressure at high speed**—gauge should show a gradually rising pressure, not in excess of 25 lb. If excess is shown, stop engine and report to supervisors.

14. **Check tilt and lift**—lift and tilt operation should be smooth. Report any jerky motion or unusual action to supervisor immediately.

15. **Check clutch and brake pedals**—note return action of each pedal. Free travel should not exceed 1½ in.

16. **Check emergency brake**—hand brake should hold properly with one third of travel in reserve.

17. **Check brake operation**—not in actual operation the stopping effectiveness of brakes. Report any pull to one side, unusual noises or grabbing.

18. **Check for leaks**—look for any leaks or seepage from oil, gasoline, water or hydraulic fluid lines.

19. **Check battery**—observe water level and check terminals for looseness or corrosion.

20. **Check lights**—if operating at night.

Operator should be alert to general performance of his machine. On the check chart he should mark "OK" all satisfactory items and "NR" (need repair) where defects are noted. Major defects should be reported immediately to supervisor and machine taken out of operation.

At the end of each shift operator should park his machine in an assigned area, set the hand brake, put shift in gear and *turn off ignition*. His daily ticket or chart should then be turned in. Machines should never be left on the dock or warehouse floor over-night or between shifts.

Use of Porous Underdrain Plates in Industrial Plant Water Filtration

POROUS underdrain plates are playing an increasingly important role in water filtration.

A number of plants still employ the graded gravel support method for filter media, which has been in use for many years, but more and more engineers are becoming interested in the newer, more efficient, porous plate system.

The graded gravel method is unsatisfactory because of non-uniform wash and objectionable mudball formation. Furthermore, maintenance costs are high because loss of sand and disruption of the filter media often necessitates frequent rebuilding of the filter system.

On the other hand, the very principles that apply to the porous filter bottom construction (illustrated), eliminate the above problems.

Advantages

The outstanding features of the method, as evidenced by many municipal and industrial installations, are as follows:

(1) Filter media is protected against loss.

(2) The depth of filter media can be reduced appreciably wherever a shallow penetration of solids is experienced, because there is no mechanical or structural reason for maintaining media depths as before.

(3) Complete suspension of all filter media is obtained because of backwash discharge from the entire bottom area. This factor improves washing performance with a reduction in washing time, and, consequently, volume of wash water.

(4) The total filter height is reduced, often resulting in reduced height of building, piping, etc.

(5) Reduction in height and pressure loss is reflected in improved economy of operation.

Plate Construction

Aloxite porous media, manufactured by The Carborundum Company, are made from grains of fused crystalline aluminum oxide, held together with special ceramic binders.

Many grades of Aloxite porous media are available for a variety of applications. The basic difference between grades is that of pore size, which is controlled primarily by the size of grain.

Partial view of a typical false bottom structure showing filter media (sand) supported directly on Aloxite porous underdrain plates.

In standard filter media support, for example, Aloxite plates grade 160 are recommended. The grain size in these plates can be compared roughly with torpedo sand (or the finest layer of gravel in older systems.) The resultant pore structure completely supports filter media without penetration.

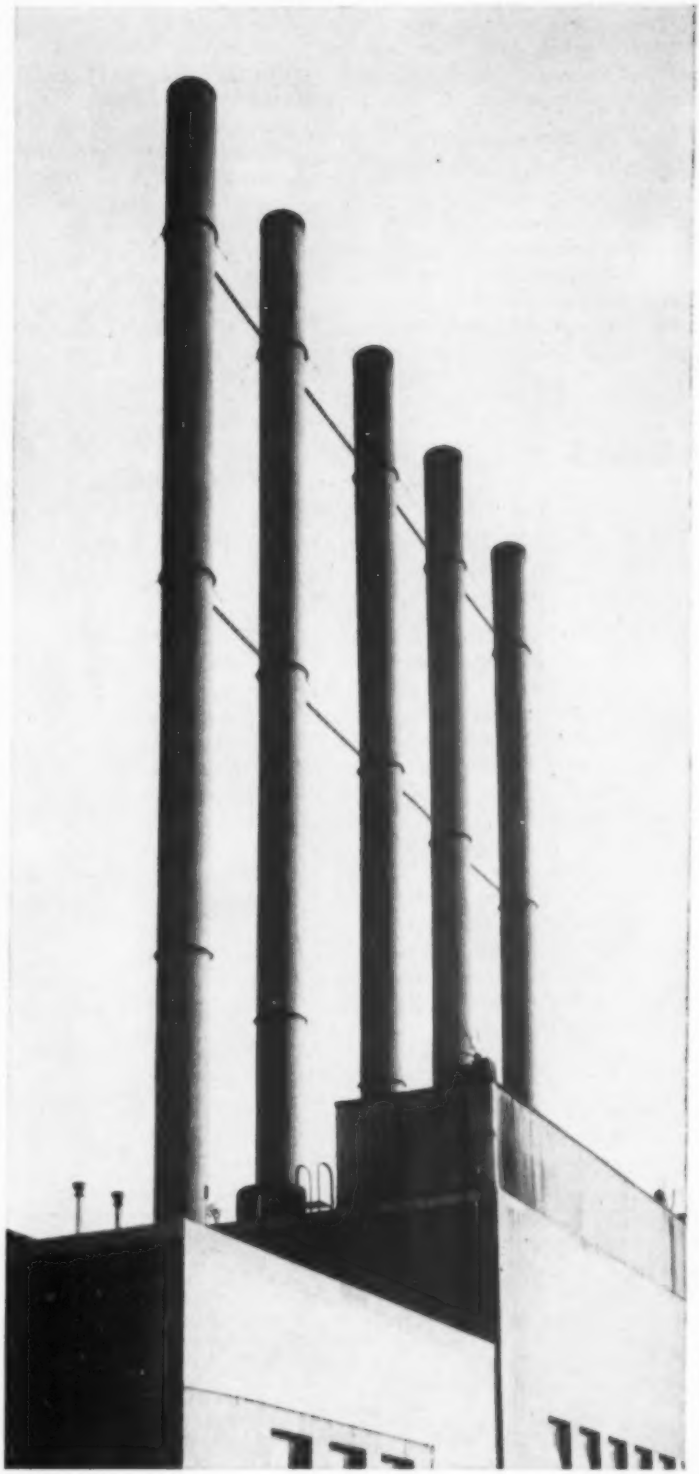
In resistance to physical shock, Aloxite porous media are fairly

This Modern Chemical Producing Plant Used

BYERS WROUGHT IRON PLATES

TO KEEP THEIR STACK INVESTMENT FROM GOING

"UP IN SMOKE"



Because stack maintenance comes high, engineers of this modern chemical producing plant got "down to earth" facts before they selected material for the five new stacks at the Company's Chemical Plant, Louisville, Kentucky.

A thorough investigation of wrought iron's corrosion resistance, and past records of the material in stack service, indicated wrought iron plates as a solution to excessive maintenance and repair. The stack fabrication and erection job was turned over to W. E. Caldwell, Louisville. The stacks are 126 feet high and 54 inches in diameter.

With today's high maintenance costs, it's just plain good business to assure that every metal stack lasts as long as possible, with as little attention as possible. The importance of this move increases as stacks grow taller, for the higher the stack—the higher the cost of maintenance.

Byers Wrought Iron plate is a veteran in stack service. Engineering records provide convincing evidence of its superior durability. You can review some of these records, and see how wrought iron has helped others solve the problem of premature failure and maintenance by writing for a copy of our bulletin, WROUGHT IRON FOR FLUE GAS CONDUCTORS AND COAL HANDLING EQUIPMENT. It may help you . . . so write today.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. Export Division: New York, N.Y.

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TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS

rugged. Plates may break if dropped—since they are brittle ceramic products—but delicate handling is not required.

Maintenance Data

Generally, no maintenance of Aloxite underdrain plates is required. Overloaded filters or inadequate pre-treatment will, however, often cause fine alum floc or other minute coagulant solids to penetrate the filter bed. Such solids will normally pass through porous plates but continued presence may cause slight progressive clogging. Fine alum floc is simply and economically removed from porous plates by saturation with 2 percent sodium hydroxide in an overnight treatment without removal of filter media. This treatment also cleans the filter media.

In other instances involving lime softening or iron and manganese removal filters, there may be progressive coating of filter media and clogging of underdrain plates over an extended period of time, if pretreatment is inadequate. This condition is easily remedied by applying 5 per cent of hydrochloric acid, containing an inhibitor, directly to the filter media and plates. The required "pickling" period will depend on the extent of coating and may be determined by a laboratory test on filter media alone.

By Frank C. Roe, Senior Sls. Eng., Refractories Division, The Carborundum Company, Perth Amboy, New Jersey.

Rolling Adjustable Platform

FOR THE PURPOSE of replacing lamps and repairing wiring and fixtures above the spinning frames, without interfering with machine operation, we fabricated a rolling adjustable platform by electric welding scrap pipe found around the plant.

This platform can be moved in any direction by aligning the wheels with the rows of equipment in route of the desired movement. The height is adjustable and the legs are adjustable for any alley spacing. The platform eliminates ladders and the hazard of falling objects striking machine operators.

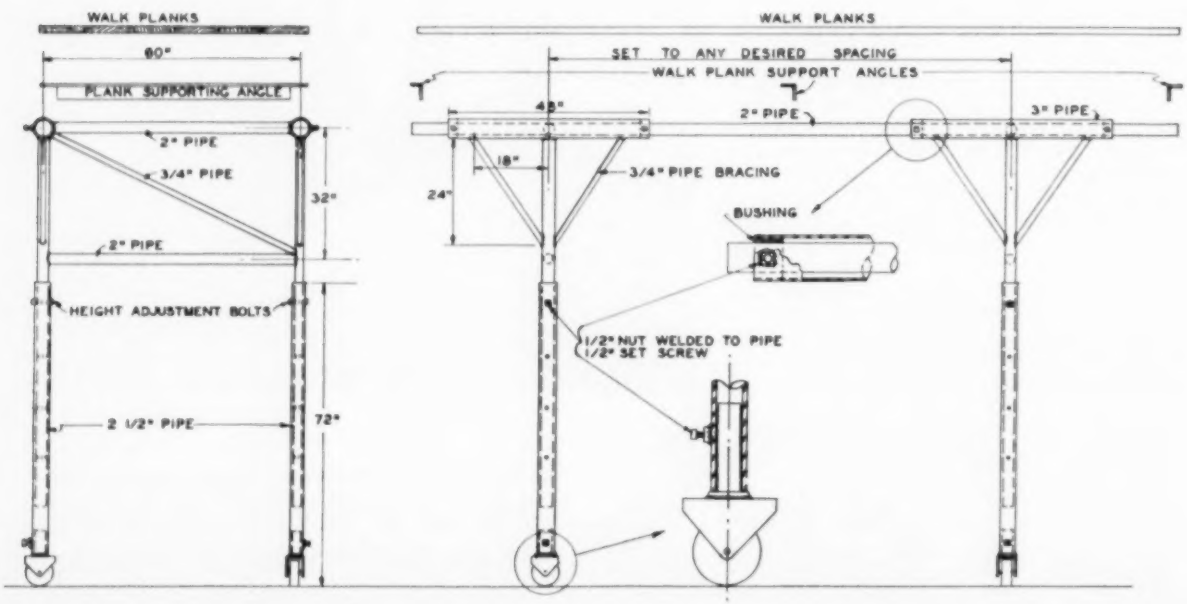
Standard 6 in. rigid casters were used for wheels, with a piece of shafting turned to fit inside the pipe legs and welded to the top of casters. It is held in place by a square head set screw passing through a hole drilled in the pipe and a nut welded to the pipe leg.

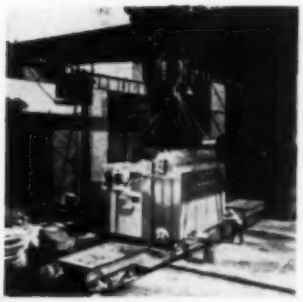
The top T-piece of each leg is 3 in. pipe with a bushing in each end. The bore of the bushing is a loose fit on the O.D. of the 2 in. pipe stringers, so that alley spacing of the legs can be easily accomplished.

A nut is welded on the outside of each end of the 3 in. pipe, and a square head set screw is passed through pipe and bushing to secure the 2 in. platform supporting pipe stringers after spacing adjustment has been made. Additional cross members for supporting top planking may be made from angle iron, by notching out each end to proper width and placing them across the pipe stringers.

The dimensions shown on the sketch are to fit our conditions here, but may be changed to fit conditions for any similar overhead job such as painting, pipe work, shafting, etc.

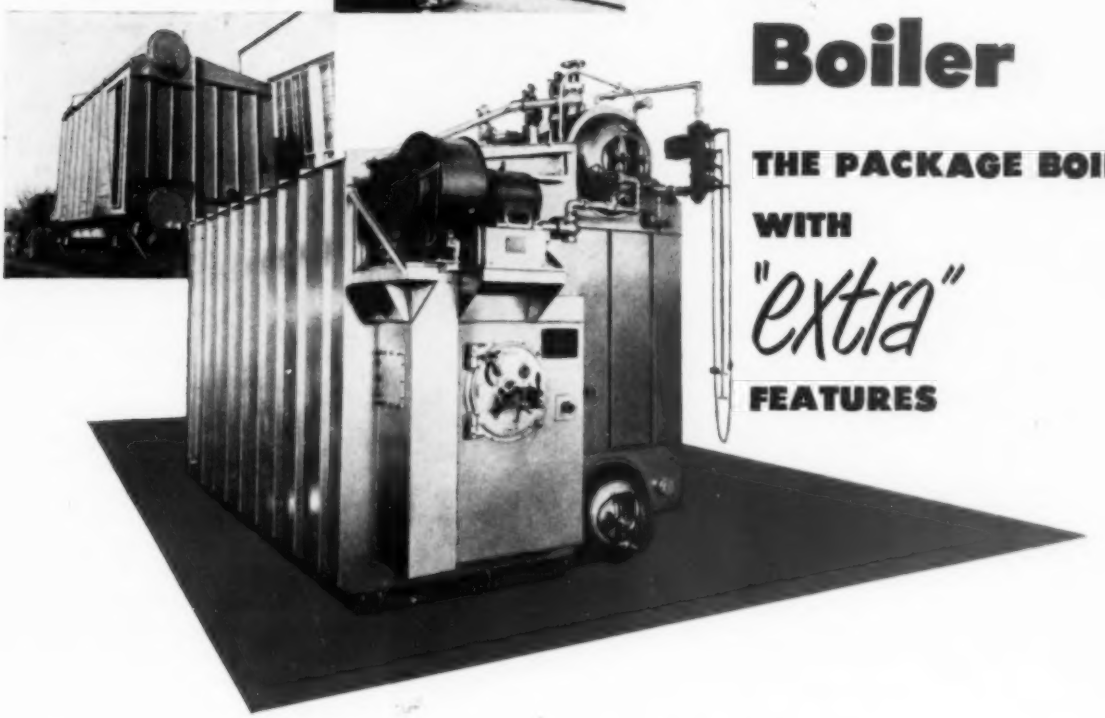
By H. C. NORMAN, Master Mechanic, West Boylston Mfg. Co., Montgomery, Alabama





the VP Boiler

THE PACKAGE BOILER WITH "extra" FEATURES



Most of the water-tube "package" boilers available today look very much alike. As a matter of fact, in some respects they are alike.

The prospective purchaser's job is to discover which of the several package boilers now available offers a combination of features and advantages that adds up to the "best buy".

Consider, then, the fact that the C-E Package Boiler, Type VP, has *all* the design features offered by any of its contemporaries *plus* the important extra features described at the right.

VP Boilers are available in capacities from 4,000 to 30,000 lb of steam per hr; pressures to 250 psi. Send for Bulletin VP-14.

FULLY WATER-COOLED FURNACE — Even the front or "burner" wall is protected, except in three smallest sizes. Has higher ratio of furnace-wall cooling to furnace volume than any boiler of its size and type. Assures rapid and efficient heat absorption, lower gas temperatures entering convection bank, reduced tendency to slag formation. Minimizes furnace maintenance.

LARGER LOWER DRUM — The large lower drum, 30″ in diameter, permits simple, symmetrical tube arrangement; provides easy access when necessary for washing down or for inspection; greater water storage capacity facilitates handling fluctuating loads.

CENTRIFUGAL FAN — This type of fan is more efficient, operates at lower speed and is quiet in operation. The average noise level is less than half that of typical high-speed blowers used on most boilers of this type. Low noise level is particularly advantageous in confined space and in such installations as hospitals.

SIMPLE BAFFLE ARRANGEMENT — Minimum changes in direction (no baffle at all in convection bank in larger size units). Gives lower draft loss. Simplifies soot blowing. Cross-flow of gas with elimination of dead pockets gives maximum heat pick-up. Water-cooled baffle in intermediate sizes insures minimum maintenance.

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Demineralization

(*Starts on page 74*)

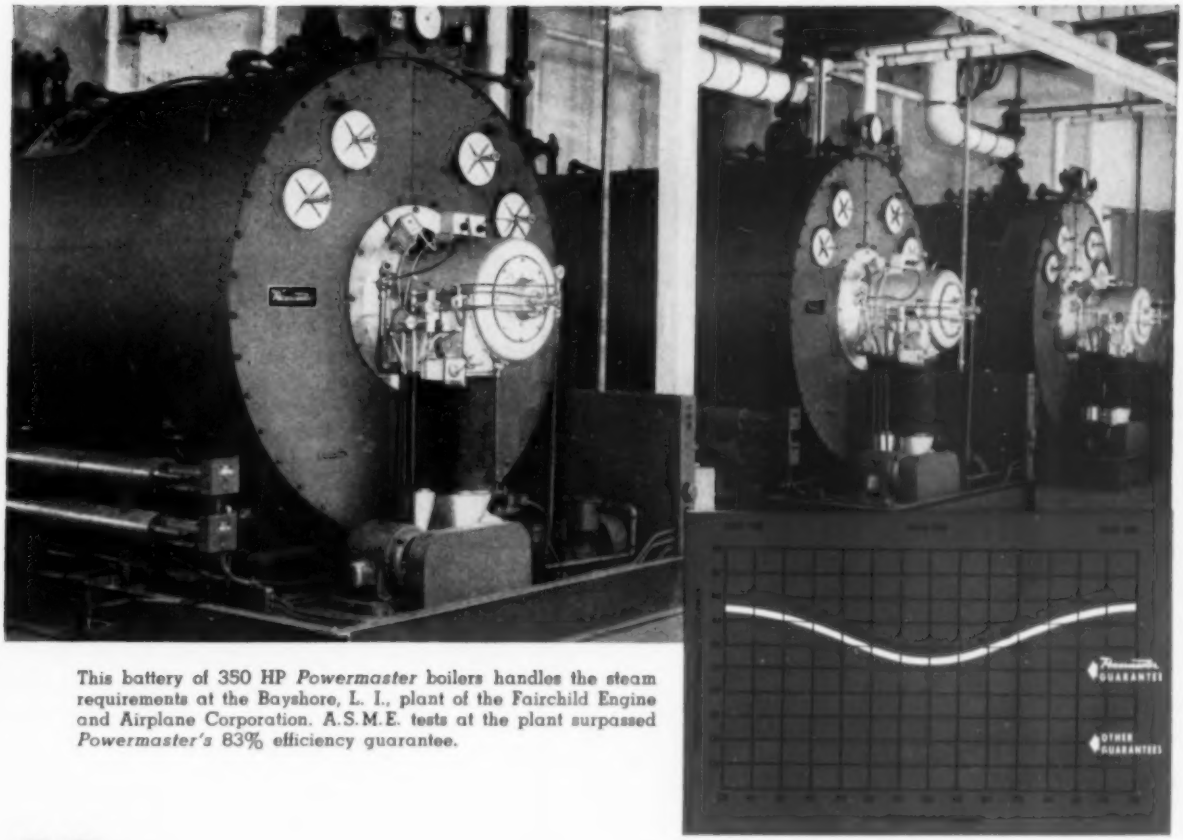
the free CO_2 by blowing air upward through a staggered tray stack counter to the flow of water. The shell may be of wood or a rubber lined steel tank. In either event, wooden slats are used. On some occasions, it is desirable to replace the trays with Raschig Rings.

Vacuum Deaerator

A vacuum deaerator, Fig. 11, removes both oxygen and CO_2 from the water, whereas the degasifier removes only free CO_2. The vacuum deaerator consists of a rubber lined steel tank containing a stack of either Raschig or wooden salts. To maintain a vacuum closely approximating the vapor pressure of the water at the prevailing temperature, a three-stage steam jet air ejector is commonly employed. It is possible to reduce the oxygen in this manner to 0.1 or 0.2 ppm although it is not practical to obtain zero oxygen as may readily be obtained with a deaerating heater employing steam for deaeration.

If demineralized water were to be transferred in steel pipe or stored in steel storage tanks it would be essential to use a vacuum deaerator instead of a degasifier to reduce corrosion. It must however, be recognized that a demineralized water which is free from all mineral solids and oxygen will pick up a small amount of iron unless the tanks and piping are given some protective coating. If no protective coating is applied it is recommended that the pH of the water be increased to 9.2 which will greatly retard iron pickup.

Only a very small amount of caustic soda is required to increase the pH to 9.2 considering that water demineralized by a two-bed system has no free CO_2 and a pH of approximately 8.3. Demineralized water from a mixed bed unit also has no free CO_2 but because of the absence of any electrolytes it has a pH of approximately 7. The feeding of a small amount of caustic soda to demineralized water from a mixed bed unit is even more important if the water will have



This battery of 350 HP *Powermaster* boilers handles the steam requirements at the Bayshore, L. I., plant of the Fairchild Engine and Airplane Corporation. A.S.M.E. tests at the plant surpassed *Powermaster's* 83% efficiency guarantee.

83% minimum efficiency with No. 6 Oil guaranteed only by Powermaster®

The "pay-off" on a boiler is its operating efficiency!

Take a look at this typical efficiency curve of *Powermaster* . . . then compare A.S.M.E. tests with those of any other boiler! At less than full load (which is normal in field operation) notice that *Powermaster* efficiency actually *increases*.

There's a reason for such efficiency. The *Powermaster* is the development of 68 years' experience in boiler manufacture. Continuing research and progressive engineering have consistently been reflected in *Powermaster* design:

- **FIRST to provide the Voriflow air-atomizing burner.**
- **FIRST to provide full modulating cam control.**
- **FIRST to provide immediate change-over from oil to gas firing.**
- **FIRST to provide a complete packaged unit.**

Point-by-point, *Powermaster* welcomes comparison. Before deciding on a new boiler for your plant, be sure to get the facts on the new *Powermaster* with *Voriflow* combustion. Just drop us a line and we'll be glad to send you complete information.

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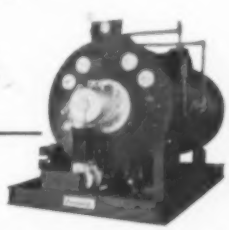
In sizes to 500 HP; pressures to 250 psi.



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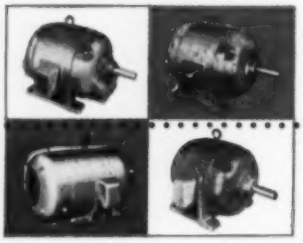

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any contact with steel piping.

Conclusion

Public utility engineers have promoted the use of higher steam pressures and have found the need for using the best possible treatment of make-up water. Formerly, evaporators were the only type of equipment which could be used, but with the recent advancement in the field of demineralization by ion exchange, the mineral solids can now by removed by ion exchange more economically than by evaporation. Demineralization also makes possible a more efficient heat cycle than evaporation.

Pipe Covering Shortcut

PIPE covering insulation can be installed faster and cheaper using a Bostitch T5 tacker. Rosin-coated staples (9/16 in. long), are used to replace the old large individual ¾ in. staples.

Workmen using the older method usually carry the staples in a pocket or an apron, and tap the staples into the covering with pliers or a similar tool. The staple tacker mentioned above speeds up the work by eliminating the individual handling of the staples. In addition, when working in high areas, one hand is always free for safer holding.

Rosin paper, tar paper, and canvas are held with these staples. In most installations the canvas is merely held prior to sewing; however, in dry, out-of-the-way places, sewing can be eliminated. The inner section of anti-sweat pipe covering can be put on with this technique also.

Through the faster application of pipe covering, we paid for the staplers in about three months. The new staplers are cheaper than the original ones; however, there is a tendency to use more due to the ease of application. Our studies at Dan River indicated that the overall cost of the staples was the same for both cases, with all the savings coming from increased labor efficiency.

By C. H. Thayer, Industrial Engineering Dept., Dan River Mills, Inc., Danville, Virginia.

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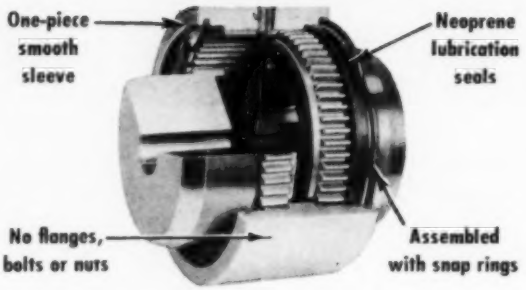

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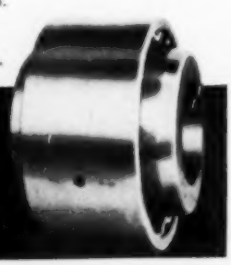

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SYNCHRONOUS MOTORS

How to Cure Vibration Troubles

By J. H. Jones,

Manager, Service Dept., Electric Machinery Mfg. Company

Vibration gremlins don't come out and hit you between the eyes. You are going to have to dig in and find them. Here are pointers on where they can show up.

THAT new motor you are going to install should purr as smooth as a kitten the first time it turns over, if everybody along the line has done his job as he should. Then again, it seems that as hard as one tries to assure himself that a really bang-up job has been done somehow gremlins sneak in. Trouble on a new installation can show up in a variety of ways and one that you will probably run into as often as any other is vibration. You know that it can show up in any kind of a motor and the higher the speed the greater the possibility of your having a vibration problem. While any one of the various kinds of motors could be considered in a discussion on vibration, let's talk about a synchronous motor.

Measure the Vibration

If your synchronous motor seems to be vibrating more than you think it should, why not get a meter from someone to measure that vibration so that you and anyone you talk with about it will know whether the vibration you are concerned with is one, five or ten mils. There are any number of good vibrometers which give a reading in mils and if you don't happen to have one, the local motor repair shop should have one, or if that doesn't work out, you might talk with the engineers at the local power station to see what they can do for you. Vibration is usually measured at the sides of the bearing housing, or at either side of the bearing bracket at about shaft height. If you have a pedestal type machine, take measurements at either side of the pedestals and at either side of the frame. However, you will probably be having most of your trouble with the higher speed bracket type motors.

Organize Your Checking

Your first check will be made when bringing the motor up to speed and synchronizing so if you have vibration, note whether it occurs before or after synchronizing. If you get vibration while coming up to speed and before synchronizing, it is most likely due to something mechanical such as unbalance or alignment. If you get your vibration after synchronizing it is very likely an electrical problem such as a partially shorted field winding, which causes unbalanced electrical forces.

Are Motor Feet Solid?

One of the easiest checks to make, which should also be one of your first, is to loosen all of the hold down bolts in the motor feet and with your finger at the junction of the motor feet and the base feel if there is any vibration of the motor foot relative to the base. If there is, the motor foot has not been properly shimmed depriving the motor of one of its intended supports and giving it an opportunity to vibrate.

You can, of course, tighten the motor feet down to the base by pulling down on the hold down bolts but this only distorts the motor frame and tends to generate vibration rather than resist it as well as throw your alignment off. Be sure your motor feet are properly shimmed so that they rest firmly and solidly on the base before the hold down bolts are pulled up. The shims should give solid support directly under the endplates of the motor frame and not just under the extreme edges of the feet.

Maybe a Wedge Slipped

However, don't think that you're out of the woods if you find that one of the motor feet needs some shims. There is a good chance that you had those feet properly shimmed at one time so you should look further to find the reason for the change. On new jobs, especially, check the installation of the base again to be sure that the wedges between the base and the foundation didn't move after you had your base alignment set and also satisfy yourself that you have a good grout job with no void between the base and the grout. This sort of thing probably doesn't happen very often but it is something that you should satisfy yourself on.

While we are talking about bases,

remember that a new base as you get it from the manufacturer isn't necessarily true in every respect just because it is new. It's subjected to considerable stress and strain before you lay it on your foundation, so be sure that it is level and true in every respect even if you have to twist it into shape with the foundation bolts during installation.

You should cast a critical eye on that base just to satisfy yourself that it is properly braced. The higher the base the greater is the reinforcement required at the ends as well as probably through the middle depending upon the size of the base and the size of the motor.

Unlikely Shaft Is Sprung

There is another item which could cause vibration within a motor and is the one which probably is most often first thought of as the cause of the trouble and just as often doesn't enter into the picture at all. This is a sprung shaft. While it is of course entirely possible to spring a motor shaft by extremely rough handling, those shafts are usually designed for rough treatment during both handling and operation so they can take a certain amount of abuse but it still makes sense to handle the shaft and the rest of the motor as you would handle a delicate instrument. There is always the opportunity to use an ounce of prevention to save you headaches later on.

Running Coupled

Now if you are running coupled to the load and you have vibration on coming up to synchronizing speed, all of the previous comments on checking the motor alone apply in general to both the motor and the driven equipment, plus the combinations you get in the additional stresses from the torque transmission of the motor to the load. There are also the many additional considerations that the various characteristics of the load bring into the picture.

Alignment OK?

One of the first things you will want to check is the alignment of the motor and the driven equipment. Carefully review your alignment, being sure that the shafts are level, in the proper horizontal position to each other, and not at an angle to each other. Air gap measurements at several points around the gap are easy to get on open type motors. This check should be a must on any job other than bracket type motors where you have to set up the air gap during alignment.

Go Over The Coupling

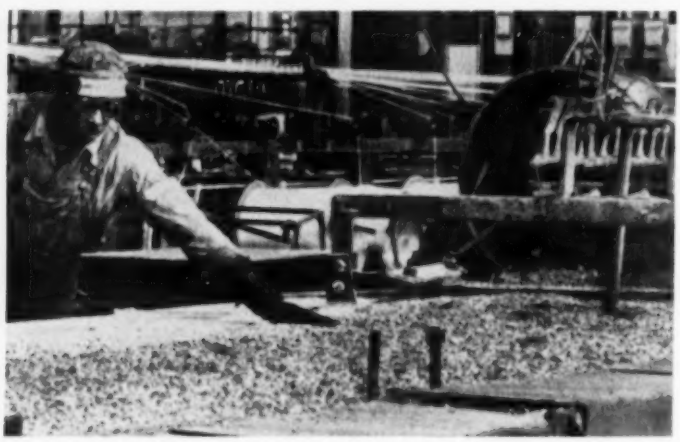
While you have no doubt satisfied yourself that the coupling is the proper size and in good operating condition, take a look to see if the key is about the same length as the keyway in the coupling or if someone slipped in a key the full length of the keyway on the motor shaft which sometimes runs quite a ways farther back on the shaft beyond the coupling. If the key is considerably longer than it need be you can gain a refinement in the balance of your set up by cutting the key off to the proper usable length. The gain in reducing vibration will not be significant but it will smooth it out somewhat as well as eliminate a safety hazard.

Poor grouting and questionable base installation would tend to show up more quickly as a cause of your trouble when you are coupled to the load and especially if the load requires high starting torques and/or is pulsating in nature.

Another thing that becomes more important when coupled to the load is the base. When subjected to the various forces of a motor and its driven equipment under varying amounts of load, a flimsy base such as a relatively high but non-reinforced unit will tend to flex and move allowing the coupled motor to vibrate as compared to no vibration when the motor was uncoupled.

Don't forget to analyze the load that you are driving—it may be the guilty party. Such things as unbalanced operation of compressors, worn spur gear drives, hammermills, etc., can cause any amount of trouble.

Very likely, not one of these things will come out and hit you between the eyes. You're going to have to dig in and find it. And the relative importance of one or all of these suggestions depends upon what kind of a motor you are working with, what the load is, and the many other circumstances peculiar to your own installation.



Despite Hot Zinc—Hands Are Cool

HERE'S HOW to protect your hand when you put it on top of 787 degree-hot molten metal: put a layer of popcorn-like vermiculite in between.

That's what is done to insulate vats of molten zinc in a large southern wire rolling mill. On top of the liquid metal, a 3 in. layer of this granular, mica-like material is used to help maintain even temperatures, and prevent unnecessary heat loss. It works so well that a hand can be placed on the vermiculite, according to the Zonolite company, Chicago, producer of this insulating mineral.

What does the trick are the many tiny air cells in each particle that slow the passage of heat.

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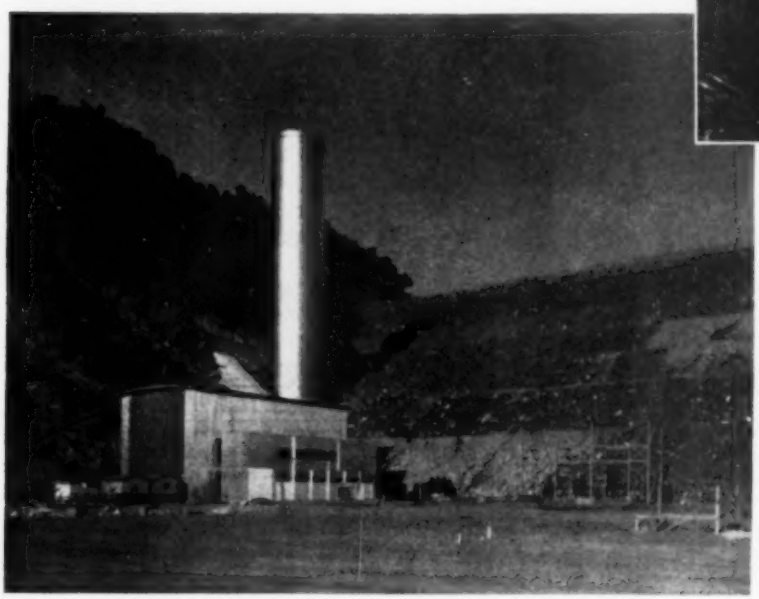
and
WELDED STEEL TUNNEL LINING

Welded steel lining being installed.



Surge tank and powerhouse at the South Holston dam.

We fabricated and erected a 36-ft. diam. by 187-ft. surge tank and 845 ft. of welded steel tunnel lining for TVA's earth and rock fill dam on the south fork of the Holston River near Bristol, Tennessee. Surge tanks and penstocks such as this are examples of the heavy structures we build for construction projects and industry.

When planning welded steel plate structures write our nearest office for estimates or quotations. There is no obligation on your part.

* *Structures fabricated and erected by Chicago Bridge & Iron Company.*

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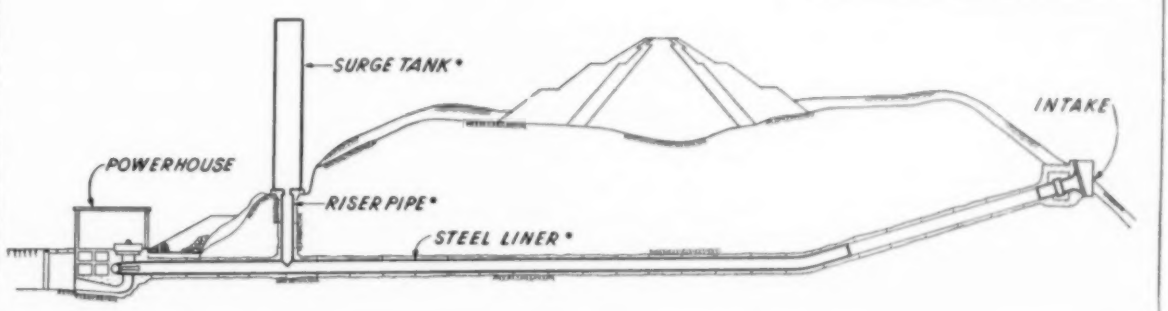

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Chicken Coop Silencer

IF YOUR plant or office is otherwise quiet, chances are that nearby forced draft cooling towers or evaporative condensers are a source of summer annoyance. Such was the case at one of the State Hospitals, where a large evaporative condenser was located in a lean-to on the side of the administration building.

Air noise was the big problem. The lean-to performed no function other than that of hiding an unsightly condenser. Air discharge was through a conventional discharge elbow mounted on top of the condenser and projecting through the roof of the lean-to. Air reached the condenser intake through louvers located in the lean-to wall. Intake air velocity was low (300 fpm) and presented no noise problem.

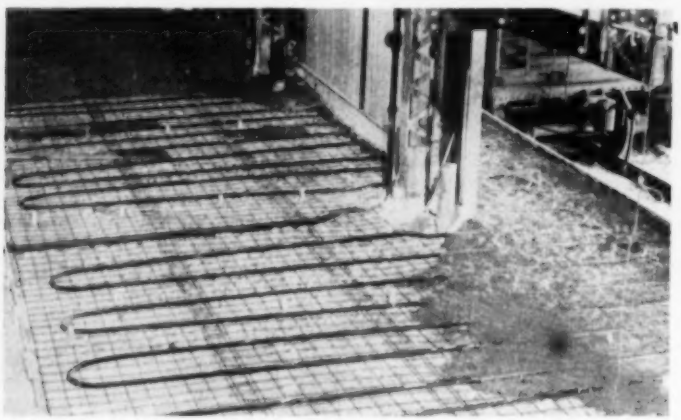
Not so the discharge elbow. Stiffening the elbow and applying auto-body undercoat helped, but not enough. Replacing the elbow with the "chicken coop" shown atop the lean-to in the photograph proved the answer, however. Its effectiveness can be judged by the fact that water dripping into the condenser pan can be heard over air noise at any location.

The coop was built of 1 inch thick lumber on a 2 x 4 inch framework to eliminate any vibration. Two opposite walls are louvered with 1 x 6 slats with rounded corners set at an angle; the roof and remaining two walls are solid. Internal baffles could have been added to even the discharge velocity over the height of the louvers somewhat. The louvers were proportioned for an average air velocity of 400 fpm across the face of the louver and are 1½ times as high as they are wide.

The coop is set directly over the air discharge opening on the evaporative condenser. The base of the coop is several times as large as the duct that discharges into it, thus there is a sudden expansion of the air. The base of the coop is square, and of such area that if even air flow were obtained the air velocity would be 800 fpm across the base.

One word of caution; the moist air rising from the coop will condense on any windows in conditioned spaces above the coop and near enough for the moist air to contact the glass. In our case, this difficulty was encountered on two windows only, and these were within twenty feet of the coop.

By John A. Weber, Austin, Tex.



Radiant Heating Eliminates Condensation

A SOUTHERN sugar refiner has solved what was—literally—a sticky problem, through the use of radiant heating.

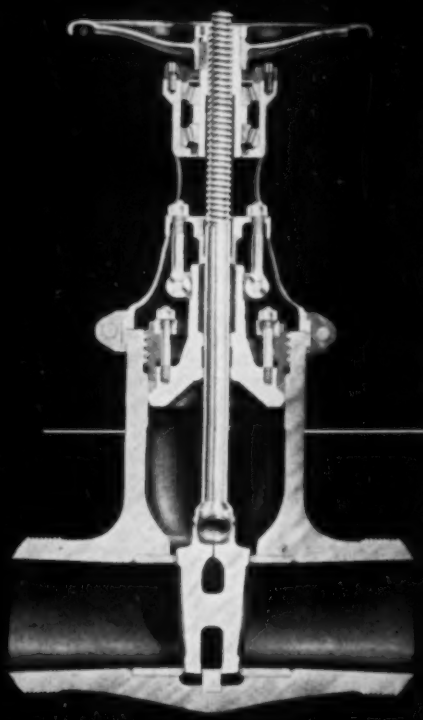
Officials of this cane sugar refinery had been plagued by the presence of moisture on the floors of their raw sugar warehouses at a deep water port where relative humidities range quite high. Floors consisted of concrete covered with ¼ in. steel plates. Cold-weather "sweating," particularly after a warm humid night, created a hazard because of the inevitable spilling of sugar, the small particles adhering and making the area dangerous to work in.

Engineers decided the job couldn't be tackled by halfhearted measures. They ripped up the old floor, installed radiant heating coils of one-inch wrought iron pipe, and laid a new floor over them. The system was extended also to cover all runways from the wharf to the manufacturing area.

The installation, which is regulated to keep the floor slab at a temperature 5 to 8 degrees warmer than that outside, has completely eliminated condensation. Recently the entire refined sugar shipping department got a similar treatment which includes all storage and operational areas as well as shipping platforms.

Don't miss . . .

Equipment, supplies, and methods—59 new items for the plant maintenance man starting on page 8.



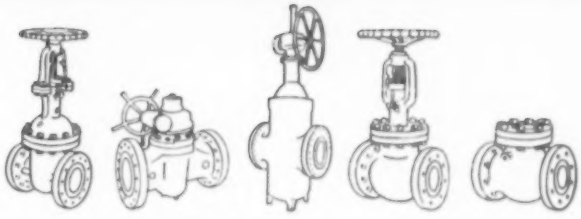
STEEL

COMPLETE LINES OF CAST STEEL VALVES AND PIPE FITTINGS are manufactured by Walworth in a variety of pressure classes, types, sizes, and patterns for general industrial use. Walworth also manufactures cast steel valves for specific service applications.

Walworth produces steel bar stock valves, and cast steel valves made of carbon steel, carbon molybdenum steel, corrosion-resistant, and heat-resistant alloy steels. Included are gate, globe, angle, check, and lubricated plug types. Sizes range from ⅛ to 30 inches; pressures range up to 5,000 psi. Full information is contained in Walworth General Catalog 52, a copy of which will be forwarded if requested on business letterhead.

Walworth also manufactures complete lines of valves and fittings made of bronze, iron, and special alloys as well as steel. Walworth-made valves, fittings, and pipe wrenches total approximately 50,000 items.

Walworth engineers will be glad to help you with your problems. For full information, call your local Walworth distributor, nearest Walworth sales office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, New York.



Illustrated in section is an 8-inch Series 900, Walworth Pressure-Seal Cast Steel Gate Valve designed for high-pressure, high-temperature service. Pressure-Seal Valves are available in Series 600, 900, 1500 and 2500; sizes 1 to 16 inches. Small Cast Steel Valves, Series 1500, in angle and Y-globe types, are also available in sizes ranging from ¼ to 2 inches.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

No. 6 Versus No. 2 Fuel Oil

SEVERAL years ago the representative of a leading oil company called on me and asked if I would consider using No. 6 fuel oil in the plant. I believe that my war background as an engineer on a ship gave me more knowledge of the use and economy of this fuel oil than the average mill man. Therefore, from the beginning I was most interested in the possibility.

No. 6 oil can be used to an advantage only in plants burning more than five thousand gallons per month.

Our plant is located approximately 270 miles from Charleston, South Carolina, which at present is the closest source for us to obtain this oil and even with motor transportation for that distance, the delivery price is 20 per cent cheaper than No. 2 fuel oil.

Cheap Conversion

It is true that some extra equipment is needed in order to burn No. 6 fuel oil but many people do not realize how economical the conversion can be. Our conversion at Lenoir Hosiery Mills required only the following: one tank heater, one steam preheater in the boiler room, and one electric preheater.

We burn approximately 6000 gallons per month and our complete conversion cost us $1219.65, including labor. So you can see from this that we paid for the conversion out of savings in less than a year. Most burners with minor adjustments can be made to burn a complete range of fuels from 2 to 6. In our plant, we can change from one to the other for as long as a week with no adjustments to the burner. However, for longer periods the flame should be adjusted to increase efficiency.

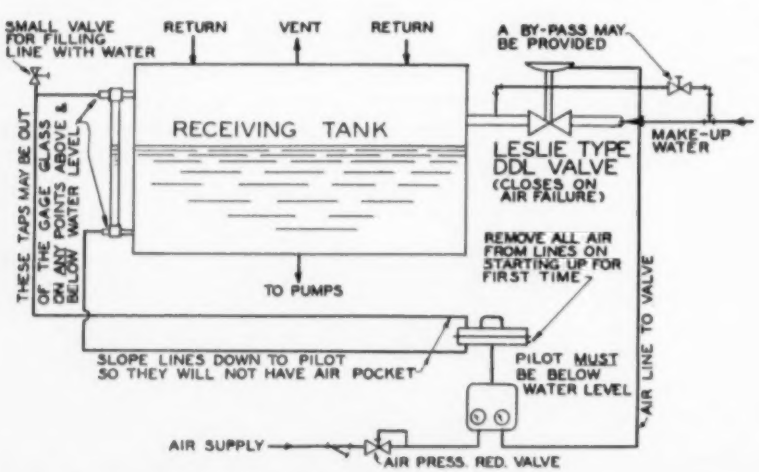
Another point that should be stressed is that a gallon of No. 6 fuel oil will give out more heat than a gallon of No. 2 fuel oil. Insurance rates in some cases may be less with No. 6 fuel oil because at normal room temperature the fire hazard is far less. Incidentally, we require no firemen in our boiler room and the only attention to our equipment is given by the watchman, who will check it on each hourly round and clean the flues when necessary on week-ends.

By Ira M. Schey, Jr., President, Lenoir Hosiery Mills, Inc., Lenoir, North Carolina.

Level Control for Condensate Tank

IN MOST BOILER plants there is a receiving tank in which condensate is collected on return to the boiler room before it goes into the boiler feed pumps. These tanks are usually equipped with make-up valves to add to the condensate returning from the plant when it is not sufficient.

The usual practice in this type of work is to use a ball float valve of some type that regulates make-up to control the level in the condensate tank. We have found, however, that a more satisfactory method is to use a floatless level control for this service which consists of a tap connection above and below the water line with leads to a differential type pilot which is sensitive to changes in water level in the tank.


SMALL VALVE FOR FILLING LINE WITH WATER
RETURN
VENT
RETURN
A BY-PASS MAY BE PROVIDED
RECEIVING TANK
MAKE-UP WATER
LESLIE TYPE DDL VALVE (CLOSES ON AIR FAILURE)
THESE TAPS MAY BE OUT OF THE GAGE GLASS ON ANY POINTS ABOVE & BELOW WATER LEVEL
REMOVE ALL AIR FROM LINES ON STARTING UP FOR FIRST TIME
TO PUMPS
SLOPE LINES DOWN TO PILOT SO THEY WILL NOT HAVE AIR POCKET
PILOT MUST BE BELOW WATER LEVEL
AIR LINE TO VALVE
AIR SUPPLY
AIR PRESS. RED. VALVE

Typical installation of Leslie Co. make-up water control on condensate receiving tank.

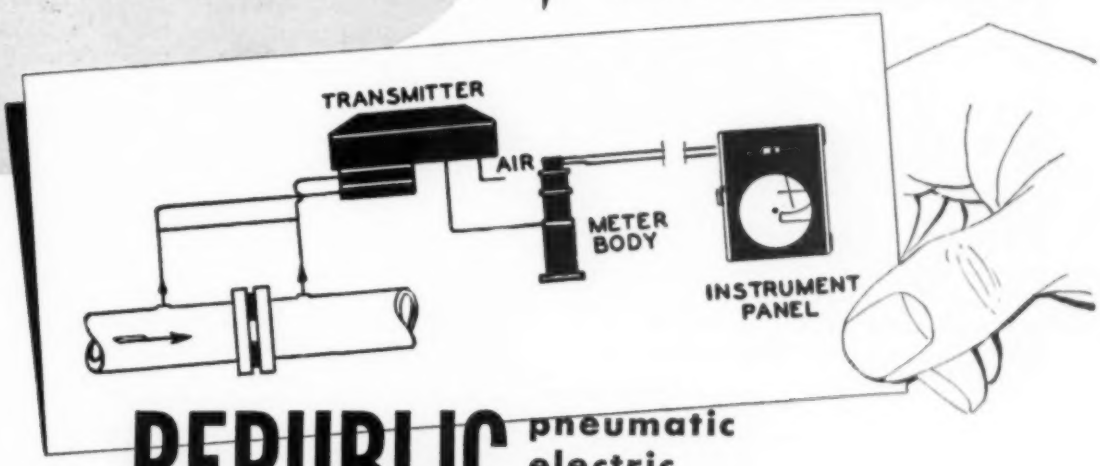
The pilot sends air pressure to a diaphragm valve which controls make-up water to the tank. The control is installed so this diaphragm valve is closed unless air pressure is on the diaphragm. This means that at night when the air pressure is off, as is normal in most plants, the valve will be positively closed, and there is no danger of the tank overflowing all night as is likely with ball float type controls.

The level of the water in the tank may be changed or controlled from the differential pilot at will by the operator. The pilot connections may be located at any points above and below the water level as indicated in sketch. This installation eliminates the need for manholes or access into the tank and in general gives very good, trouble-free service.

By F. William Scott, Ga.

DO YOU HAVE THESE METERING PROBLEMS?

- TOXIC OR FLAMMABLE FLUIDS
- CORROSIVE FLUIDS
- DIRTY FLUIDS
- VISCOUS LIQUIDS
- WIDELY FLUCTUATING FLOW



REPUBLIC pneumatic electric metering system

offers a practical solution to ***DIFFICULT FLOW MEASUREMENTS***

RESTRICTS DANGEROUS FLUIDS . . .
to short lead lines and small measuring chamber in pneumatic transmitter—keeps dangerous or high pressure fluids out of control rooms and mercury-type meter bodies.

CORROSION RESISTANT MATERIALS . . .
can be furnished for measuring chamber to meet requirements of almost any fluid. Corrosive fluids do not come in contact with any other part of meter.

LITTLE MOVEMENT OF LINE FLUID . . .
in lead lines and measuring chamber is required for full range. Dirt is not drawn in to clog meter and cause failure or inaccuracies.

LINE FLUID AND MEASURING CHAMBER AT SAME TEMPERATURE . . .
When measuring hot liquids which are very viscous at room temperature, transmitter may be mounted on flow line to keep temperature of liquid in measuring chamber and flow line the same.

FAST ACTING . . .
meter body does not require large movements of mercury or oil—follows all flow, no matter how erratic or fluctuating.

OTHER ADVANTAGES . . .

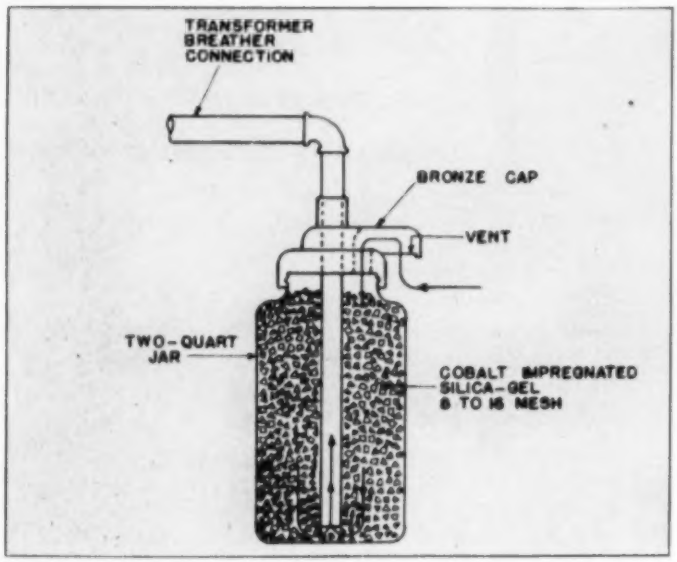
ELECTRIC TRANSMISSION
Flow information can be sent any reasonable distance. Electric meter body extracts square root from flow differential measurement, permitting use of uniformly graduated scales and charts.

CONTINUOUS INTEGRATION . . .
made possible by the exclusive Republic electric integrator aids in accounting and control of expensive fluids.

REMOTE READING INSTRUMENTS . . .
which include recorders, integrators and indicators, can be mounted separately or together, as desired.

WANT MORE INFORMATION?
A new bulletin describing the Pneumatic Electric Flow Meter and its applications is available at no cost or obligation. Send for Bulletin 704.

REPUBLIC FLOW METERS CO.
2240 Diversey Parkway, Chicago 47, Illinois



Moisture in Transformers

CAREFUL Master Electricians are constantly on the alert for water in transformer insulating oil. Oil breakdown tests and filtering at scheduled intervals plus occasional internal inspections are standard procedures. Still, water will enter transformers, particularly those subjected to wide temperature changes that cause excessive "breathing." Standby power transformers are particularly vulnerable. Modern sealed transformer tank construction or nitrogen filled designs eliminate this worry.

What about the more predominant "breathing" transformers most of us must keep in operation for many years yet? If they are fitted with oil conservator or expansion tanks connected through an oil trap to the main tank, then all is well. Any moisture entering the transformer would settle in the conservator and can be drained therefrom. Leaks in the main tank gaskets would allow oil to flow out under pressure from the conservator. This leakage is immediately evident and should be stopped quickly.

Older power transformers with open breathers to the main tank are especially troublesome. Those located in normally damp or wet areas are dangerous. We had an old bank of three 200 kva, 13,200 to 240/480 volt transformers that had water in the oil samples every year. The underside of the handhole cover and tank top were covered with water droplets at each internal inspection.

We have eliminated this problem by installing homemade chemical breathers connected to the original open breathers.

The accompanying sketch shows the construction. Air entering or leaving the transformer as it breathes must pass through the moisture absorbing cobalt impregnated Silica-Gel. The chemicals are blue when dry and pink when wet. About once a year the chemicals are removed, dried out, and replaced. We purchased the special bronze caps from Rumsey Electric Co. The ordinary two-quart jars were secured locally. The Silica-Gel was purchased from the Davidson Chemical Corp.

We have found this very simple arrangement to be a practical solution to a bad problem. Of course, our Master Electrician hasn't quit the scheduled tests and inspections, but his mind is free to tackle his other many worries.

By Robert J. Tucker, Jr., Plant Engineer, Roanoke Mills Company.

Smoke Prevention

IN one plant, serving a large wood working factory, sawdust and chips were burned in Dutch oven furnaces to generate steam in heavily overloaded 300 hp boilers. These chips were blown into the furnace tops direct from the fans, and the make-up fuel was hand fired bituminous coal, which at times produced the blackest smoke such fuel is capable of making.

Due to political pressure, something had to be done in a hurry, so it was decided to try more "over fire" air, although in the absence of exact data, it looked as if too much was already present.

A conical opening 3 in. in diameter at the outside edge of the wall, and 5 in. in diameter at the inside edge, was cut at each corner of the nearly square furnace, about a foot from the ceiling, pointing about 30 degrees downward and along each near wall; all were angled the same way to set up a clockwise whirling motion of the furnace gases. Each had set in its center, a 3-8 in. steam jet pipe, all connected to a common header supplied with 200 lb steam from the boiler, the supply being controlled by a single quick opening valve set in a convenient spot for the fireman.

When the steam was admitted to the jets, the suction set up a strong induced air flow through the openings to mix with the gases rising from the fire. When a heavy coal fire sent up the heaviest black smoke the steam valve was flipped on for the first test, and the results were startlingly satisfactory. That heavy smoke was wiped off the top of the stack as if a tight damper had been snapped shut.—*H. B. McDermid.*

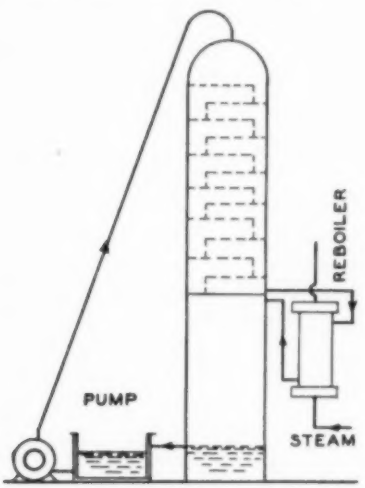
Don't miss . . .

What's new in plant maintenance—73 operating aids starting on page 158.

Chemical Supplants Manual Cleaning in Louisiana Refinery Maintenance

SIMULTANEOUS cleaning, descaling and gas-freeing of a depropanizer tower, used in the extraction of propane gas from the gases created in catalytic cracking operations during the manufacture of high octane gasoline, was recently accomplished by a major Louisiana refinery with substantial savings in time, work and costs.

This maintenance cleaning operation is performed annually at the time of the regular catalytic cracker turn-around, when refinery equipment is cleaned, inspected, repaired and returned to active service.



The deposit in the tower appeared in a heavy, crusty form on the trays, bubble caps, down-comers, walls, pans, and in the reboiler tied into the tower, as well as in the line leading to the tower, and was impeding the efficiency of this equipment.

Old Method

Formerly the cleaning was performed by manual methods requiring the services of an average of 1,840 man-hours at $1.54 per hour or $2,833.60, plus $360.00 for supervision. Over and above this, work done by boilermakers amounted to $1,520.64. Steaming and washing with water for two to three days was required to gas-free the tower so that men could enter to scrape, wire brush and wash down walls, trays, bubble caps, down-comers, etc.

Three years ago it was decided to attempt to clean the tower chemically, and the job was assigned to a contract cleaning concern. The tower was first washed with a caustic solution, then rinsed, followed by a hot sulphuric acid treatment. In this operation the tower was filled and heated with each step of the procedure. Due to a heavy deposit not removed by this chemical treatment, a refinery labor crew had to be called upon to complete the job. The labor and supervision cost was estimated to be approximately $815.00, plus $1,000 for boilermakers, and the entire operation required three full days.

Chemical Method

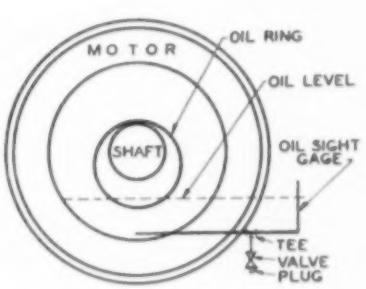
Finally, two years ago, at the suggestion of the local technical service representative of a leading manufacturer of industrial cleaning and related materials, the mechanical department of the refinery constructed a steel tank, 6 ft x 6 ft x 18 ft, made up from 3/16-in. boiler plate. Six 1 in. coils 16 ft long were then fastened to either side of the tank. Steam pressure of 200 to 250 lb was available and was connected to these coils. Suction lines in either end were of 6 in. diameter. A steam turbine pump capable of 4,200 barrels per day was made available, and the discharge line of the pump connected to the 6 in. line running up the side of the tower to carry a solution of Oakite Compound No. 88, a specialized detergent possessing the ability to penetrate carbon deposits rapidly, over the top tray of the tower.

The solution then passed down over the trays three-quarters of the way down the tower, then out through a 14 in. line through a reboiler, then back into the tar pot at the bottom part of the tower, thence back into the tank. Strength of the solution in the tank was kept as uniform as possible by frequent titration and addition of necessary chemicals. The solution was maintained at 200 F at a circulation rate of approximately 200 gallons per minute for 12 hours, followed by 1½ hours of hot rinsing and 1 hour of cold water rinsing. The temperature was boosted by maintaining steam on the reboiler and by using purge steam in the tower itself.

The results were satisfactory in every way, with the tower reported as the cleanest it had ever been in the seven years it had been in operation. In addition, the tower was passed as gas-free by the safety inspectors without considerable steaming out after it had been cleaned. The tower was then inspected by the metal inspectors and operations personnel and passed by both in a very few minutes time. The substantial time, work and cost-savings effected on this job with this method resulted in its being adopted as standard procedure in this refinery.

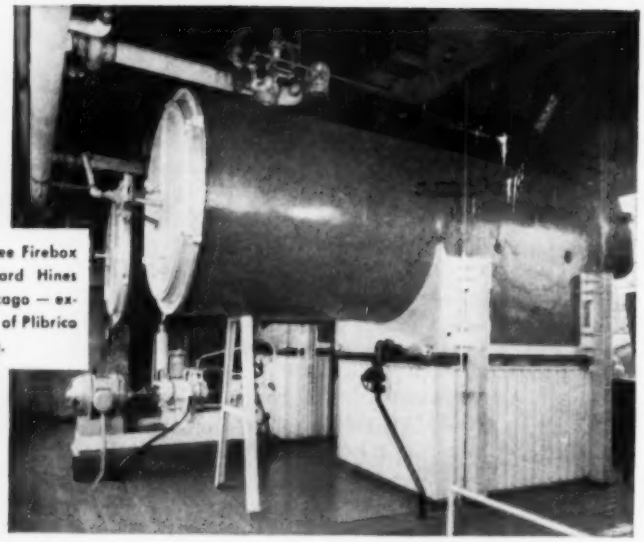
Checking Oil

TO HELP THE maintenance men in checking for foreign matter, taking samples or changing oil in running equipment, especially that which cannot be shut down, replace the drain plug with short pipe and shut off valve (Neoprene or soft seated valve). In some cases the sight gauge can be extended out enough for a T to go between it and motor housing with valve below the T and then plug the valve for safety. This could pertain to any oil filled bearing. See sketch.



Drain plugs are sometimes hard to get to and handle without dropping and still draw a sample of oil. Valves make checking a safe procedure.

By W. M. Carter, Mo.



The two Kewanee Firebox Boilers at Edward Hines Main Yard, Chicago — excellent example of Plibrico Multi-Rib casing.

Ask Edward Hines Lumber Co.—

IN THE Middle West you only need to hear a saw or smell rosin to think of Edward Hines Lumber Company with its enormous volume of wholesale business and its 25 big retail yards in the Chicago area.

The start of this fabulous organization was at 2431 S. Wolcott Ave. in Chicago where Edward Hines, then a boy of 14, entered the lumber business 75 years ago. At this site still stands the 30-acre Chicago Main Yard of the company . . . and serving the Main Yard are two Kewanee Firebox Boilers rated at 10,000 lbs. steam per hr., with Plibrico Multi-Rib bases and Plibrico linings.

This Multi-Rib construction illustrated above is one more Plibrico innovation. The big advantage of the Multi-Rib casing is its unique form which makes it lighter and more economical than conventional steel casings, yet gives it strength to carry the refractory load with less steel bracing.

Fred Peterson, Chief Engineer at the Main Yard, is highly pleased with Multi-Rib construction for two reasons: (1) he is no longer bothered with air infiltration, and (2) he has better control of the oil burners with which the boilers are equipped. Mr. Peterson has been a Plibrico booster since 1927. He is one of those experienced men who has learned the advantages of Plibrico refractories, construction methods, and installation service. Your local Plibrico Sales & Service engineer will gladly quote on any of your needs. Write for your copy of the Plibrico catalog.

Interior of Kewanee firebox showing Plibrico Jointless Firebrick lining.

Plibrico Company

1838 Kingsbury St., Chicago 14, Ill.

PLIBRICO SALES & SERVICE IN PRINCIPAL CITIES

REFRACTORY PRODUCTS • ENGINEERING • CONSTRUCTION

Recording Essential Maintenance Data

SINCE adequate maintenance records in usable form are conducive to efficient and reliable operation, our Company, too, has been faced with the problem of devising a practical system for recording essential maintenance data. However, cognizance has been taken of the pitfall of overdoing a good thing and thus mitigating its usefulness.

In setting up our system an attempt was made toward having a thorough understanding by all concerned that there are many manhours of necessary maintenance work of a minor nature to be done in a plant, but when entered into a permanent maintenance record would serve only to clutter up the record, causing it to become unwieldy. On some days all the work done around a plant is likely to fall into this latter category, yet nothing is to be gained by someone spending a lot of time in conjuring up items to make an impressive report. It was also emphasized that records would not be kept just for the sake of keeping records, but rather to serve a very useful and important purpose; namely, to aid the personnel charged with the responsibility of operating and maintaining the system generating plants in discharging their duties with greater dispatch.

Having reached this understanding, the immediate problem was to decide upon the optimum number of records to keep, the most advantageous form in which to keep them, and the most expediential method of obtaining them. After much thought, it was decided to group all the equipment in the plants into the following general classifications:

A—Coal Storage, Handling and Weighing Equipment
B—Ash Handling Equipment
C—Furnaces and Boilers
D—Prime Movers and Generators
E—Accessory Electrical Equipment

F—Miscellaneous Power Plant Equipment
G—Structures and Improvements

These broad classifications were then broken down into subheadings such as Locomotive, Bulldozer, Shaker, Ash Hopper, Feedwater Heaters, Boiler Feed Pumps, Turbo-generator, etc. In some instances even this break down was too broad, necessitating a still further demarcation as is evidenced by the general classification, "Structures and Improvements." This group was divided thus:

G. Structures and Improvements
1—Station Buildings
2—Station Building Equipment
a—Plumbing
b—Ventilating and Air Conditioning Equipment
c—Vacuum System
d—Passenger Elevator

From this outline an annual maintenance record book was made up for each plant. These books are regular 8½x11 in. loose leaf binders with each page headed with an outline number and title.

In writing up the weekly plant maintenance report, the plant personnel prefaces each item with an outline number. This makes it possible for a person completely unfamiliar with the plant equipment to insert each maintenance item under the proper heading in the record book. The following is a typical item taken from one of these weekly reports:

C-6—May 1, 1951. The motor on the No. 2 Boiler Feed Pump was found to be vibrating excessively. Vibration in the horizontal plane was over 4 mils. The end bells were removed and the bearings checked. A 15 mil shim was inserted in the bearing housing to tighten the bearing. The motor was reassembled and tested. The horizontal vibration was 2 mils.

In the equipment outline "C" is Furnaces and Boilers, while "6" is the subheading, No. 2 Boiler Feed Pump. When the typist came to this item, she removed the page from the maintenance record book titled "C-6" and typed in the entry. By following this procedure weekly, all work that had been done on this Boiler Feed Pump throughout the year was at all times completely assimilated into a very useful form.

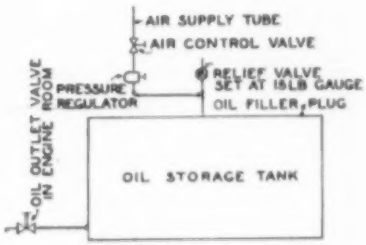
This system of keeping maintenance records has proven so practical that we are now extending it to include our files, which we are also setting up according to the plant equipment outline. Any correspondence pertaining to a piece of equipment will be placed in these files, and then at the end of each year the pages will be removed from the plant maintenance record books and placed in the file along with the correspondence. In this way, all information, both correspondence and maintenance reports, on any piece of plant equipment will be available for instant reference.

By James A. Jones, Senior Engineer, Carolina Power & Light Company, Raleigh, North Carolina.

Handling Oil by Air

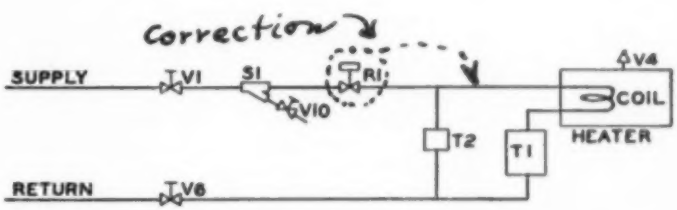
SUPERVISORS of pump stations powered by stationary internal combustion engines realize there is a saving of money, time and storage space, if oil can be bought in bulk truckload lots, instead of barrels. But transfer costs from storage tank to the engine building sometimes seem prohibitive.

A simple method that has been successfully used for several years, consists of forcing oil from the storage tank by air pressure, delivering to a convenient outlet inside the engine room. In doing this, advantage is taken of the fact that compressed air is available for starting the engines.



In using this oil conveying system, it is important that a relief valve be installed in the air supply line to protect the storage tank in cases of pressure regulator failure or if the operator attempts to speed up the process in very cold weather when the oil is very viscous and doesn't run too freely.

By George Simon, Kan.



R1 is the temperature regulator; S1, S2, and S3 are strainers; V4 is the safety valve; T1 and T2 are steam traps; V3 and V9 are globe bypass valves; and V2, V1, V5, V6, V7, and V8 are gate service valves.

"Banning the By-Pass"—(Correction)

Several readers have called our attention to an error in the third (bottom) diagram of the article "Banning the By-Pass" which appeared on page 114 of our Feb. '53 issue.

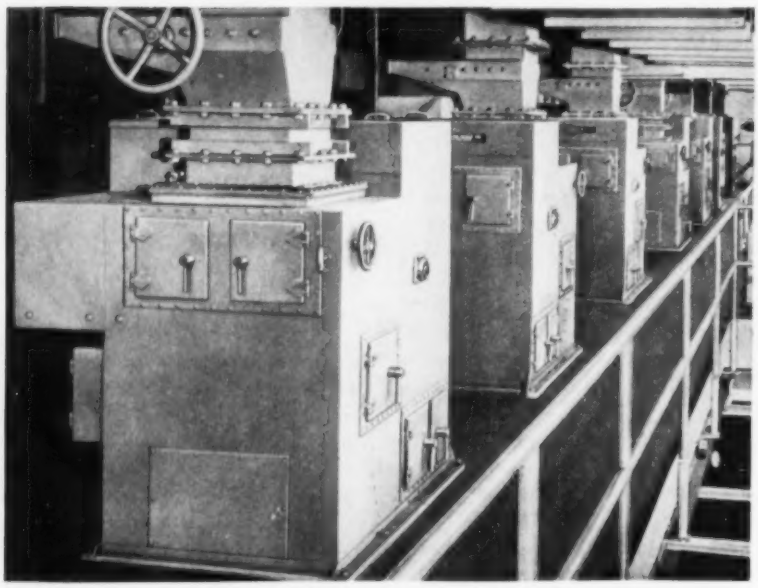
The incorrect diagram is reproduced here, with the needed correction indicated. Trap (T_2) should be connected into the incoming supply line ahead of the regulator (R_1) to keep the supply line and regulator free of condensate when the regulator is closed. *The Editors.*

Delaware Power & Light

specifies

Richardson

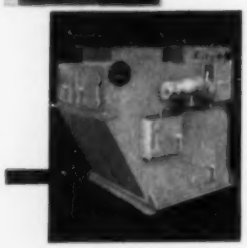
Like many progressive utilities, Delaware Power & Light Company selected Richardson Automatic Coal Scales to maintain a constant check on boiler efficiency in their new generating station. The bank of Richardson Model 39's shown now handles this responsibility.



To both industrial and utility power generating stations, specifying Richardson means—

1. A 24" x 24" inlet opening and 26" wide belt for maximum coal flowability.
2. All wiring and controls outside coal chamber.
3. Access doors which will not spill dust on floor when opened.
4. Beam ratio test facilities outside coal chamber.
5. Gravity operated by-pass, with no restriction of coal flow to downspout.
6. No drag links or wires attached to weigh hopper.
7. Nationwide after-delivery service.

Latest development in the 39 Series of Richardson Automatic Coal Scales is the Model H-39 shown below. May we send you our new 16-page engineering data book on the H-39 Coal Scale (Bulletin 0352), without cost or obligation?



RICHARDSON SCALE COMPANY · Clifton, New Jersey

Atlanta • Buffalo • Boston • Chicago • Detroit • Houston
Minneapolis • New York • Omaha • Philadelphia • Pittsburgh
San Francisco • Wichita • Montreal • Toronto

0700

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

Neoprene Extends Pump Life

MINING engineers will be interested in recent success in lining a mill tailings pump, a small mine pump, and a pipe section with Neoprene. Both pumps were severely cavitated, the tailings pump shell was ready to be scrapped and the cast iron pump had become severely graphitized in a period of less than one month.

Neoprene was applied and after one full year service there has been no maintenance expense. From all appearances both pumps have good service left in them. The materials and application supervision were furnished by the Gates Engineering Company, who manufacture the liquids from the crude Neoprene produced by the DuPont Company.

Some cavitations in the tailings pump shell were more than ½ in. deep. The shell was sandblasted clean, the cavitations filled with Neoprene putty or troweling compound and then the whole was given successive brush coats of Neoprene until a uniform coat thickness of about .060 in. above the high metal spots had been attained (about 6 coats). The entire assembly was then cured. Because of the excessive thickness of Neoprene in the cavitations, severe blistering resulted during curing. (The non-cavitated areas did not blister.) The blisters were repaired and the pump was placed in service. After one full year of service, there has been no maintenance expense (surface conditioning). Prior to Neoprene lining, this pump required monthly inspection and costly filling of cavities by welding.

For the purpose of evaluating the corrosion resistance of Neoprene to mine waters, a cast iron pump which had become very badly graphitized (⅛ in.) in less than one month was selected. The pump was sandblasted free of graphite and given a Neoprene lining (about .060 in.) and then returned to the same service.

The pump was brought to the surface after one year of normal operation. In general, the surface seems to have been practically unaffected.

The Dirt Problem in New Steam Plants

ALMOST without exception, dirt constitutes the most serious problem in the initial operation of a steam power plant. The importance of cleaning the piping is realized by few workmen. In most cases, as pipe arrives on the job, it contains varying amounts of mill scale, rust, cutting oil, steel chips, welding slag and spatter, particles of burned metal and miscellaneous foreign matter.

During erection the piping accumulates stones, sand, gravel, nails, nuts and bolts, wood, tin cans and sometimes tools and work clothes. After erection it is common practice to cut into the line to attach additional connections which are found to be necessary and there again is the opportunity for more dirt to enter. Careless slipshod workmen think nothing of burning a disc in a pipe and knocking it into the pipe along with the slag from burning.

The Remedy

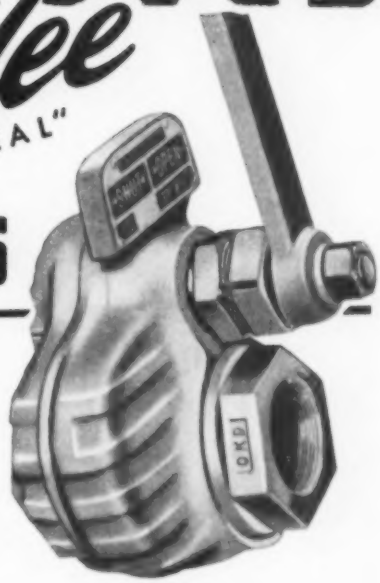
The solution to this problem is inspection and cleaning. Inspection must start in the fabrication shop and it must be thorough. The inspection during and after erection is of even more importance. The inspection must not only assure that material and workmanship are according to specifications, but also that every reasonable precaution is taken to clean the piping and keep it clean. After erection is completed piping should be given a final cleaning in as thorough a manner as is possible and practical. The piping may be washed by flushing it out with water or blowing it out with steam or compressed air.

Water is effective when used in sufficient quantity to develop a high velocity. Steam has the advantage of temperature which causes the piping to expand and dislodge some of the mill scale. In this connection it is important to blow out at least three times all of the auxiliary and branch lines as well as the main steam piping.

After going into operation it is very frustrating to find that a welded drain connection is plugged; moreover, the hazards presented by an undrainable high pressure steam line are great. The stem plugs or

APPROVED

Okadee "PERFECT SEAL" VALVES



for Bubble-tight Primary Shut-off in

L P GAS LINES

Underwriters' Laboratories, major LP gas producers*, and Liquified Petroleum Gas Commissions of several States* approve Okadee Valves for primary shut-off in LP gas lines. In addition, Okadee Valves are used in virtually all types of gas and liquid lines at pressures to 600 p.s.i. and temperatures to 800°F.—wherever a perfect seal, low maintenance and long life are necessary.

Get complete data, including material specifications, on Okadee Valves — and newest Underwriters' Laboratories test report—without obligation, today.

Names on request.

- A. S. A. Standard dimensions
- Sizes from ½" to 6"
- Single- and double-seated disc valves
- Hard-faced valves and seats . . . perfect metal-to-metal seal
- Self-cleaning, self-compensating valve discs
- Lever, rack-and-lever, or worm-gear operation
- Non-lubricated
- No wedge action
- Valves and seats wear in instead of "wearing out"
- All parts quickly replaceable in the field
- Inside and outside stem packing . . . double assurance against stem leaks

Underwriters' Laboratories Reexamination Service Guide No. 141 A3.1.22, File MH5163. SL Screwed Type Series and Series 15 and 30 Flanged Type Okadee Valves are suitable as a positive shut-off in LP gas pipelines and other LP gas applications for a working pressure of 250 p.s.i.

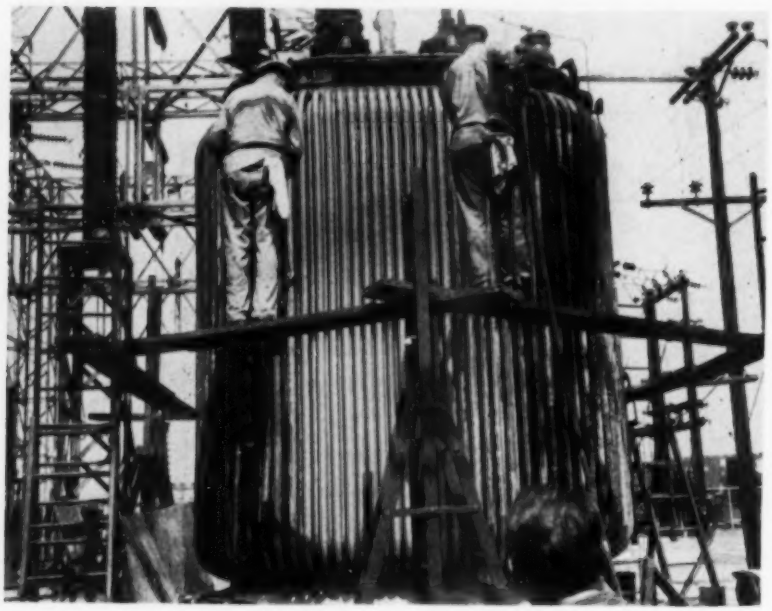
Write for Bulletin No. 51FL

OKd. Okadee COMPANY
332 South Michigan Avenue • Chicago 4, Illinois

SUBOX guards all three!

STRUCTURES
EQUIPMENT
FENCES

with maximum protection
and minimum application



• Subox paints assure both good radiation and excellent protection for transformers and sub-station equipment. They are easily applied by brush, spray or flow-coating. Use them on your present equipment—specify them on your present equipment—specify them on your new.

• All varieties of Subox and Subalox can now be supplied with a faster-drying vehicle for distribution transformers and other shop work.

• Sub-station structures can often be painted with a single coat and a minimum of outages.

• Industrial-type fences can be amply protected with one coat applied by floor brooms.

For simplified low-cost upkeep, write for free pamphlet "Electric Light & Power Maintenance".

Subox Inc.

6 FAIRMOUNT PLANT HACKENSACK, N. J.

discs should be removed from pressure regulating or flow control valves before blowing steam through them. This precaution will prevent pipe dirt from lodging in the valve and scoring it, which can easily happen when an attempt is made to blow through a pressure reducing valve blocked in the open position.

Compressed air as a cleaning agent is not very effective except on small lines because it is seldom available in the large volumes needed to clean large lines. Some lines can be cleaned effectively by swabbing them out or by cleaning them mechanically.

After a line is cleaned out it should be closed up and, if it is later necessary to cut into it, every precaution must be taken to prevent entrance of foreign matter. This may make it necessary to remove sections of the piping to permit thorough cleaning, or it may be necessary to repeat the flushing or blowing procedure.

The dirt problem is not confined to the piping. Pressure vessels, pumps, compressors, etc. must be protected against entrance of dirt. This too begins in the shop. Ordinarily it is safe to assume that such equipment is clean when it arrives on the job site. Openings such as suction and discharge connections must be kept closed until the final connections are made. Unless this precaution is taken, it is very important that the equipment be dismantled for inspection and cleaning before operating it. Pumps must be additionally protected by stout suction strainers which may be removed after several days of operation. Pressure vessels should be inspected to see that internal blocking has been removed and that the internal parts are installed correctly and properly secured.

Materials Handling Kink

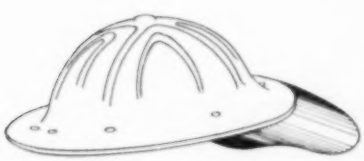
HERE is an idea that is useful in the maintenance of chutes handling sand or similar abrasive materials. Such material is exceedingly tough on steel chutes and will sometimes wear a new steel sheet 1-4 in. thick to destruction in a few days time. However, if the conditions are at all favorable, a

very simple kink can make the same steel sheet almost indestructible.

Weld baffle plates on top of the sheet over which the abrasive material flows, placing them at right angles to the sand flow and close enough together so that each plate backs up a pile of sand reaching up to the next one above it. The whole bottom of the chute is thus covered by an inert layer of sand, over which the moving sand flows harmlessly, there being no wear except on the edges of the baffles, and that is very slow.

One example comes to mind where the steel sheet wore through every three weeks until ¼ x 1½ in. baffles were welded on, spaced about three inches apart at right angles to the sand flow. The chute stayed in service for over a year, 24 hours a day, seven days every week, and showed no wear.

Similar wearing spots can sometimes be protected by welding a shelf so it holds a bank of sand for an incoming stream of sand to strike into instead of into the steel sheet. One such stream came off of an elevator into a side of the hood, and wore through regularly, until so protected. Be careful to spot your shelf right though, or the sand bank won't catch the sand stream right and you'll have the wear just as always, and the bystanders will have the laugh on you. But, if the running sand is caught in sand, your troubles with that wearing spot are over.—*H. B. McDermid.*



Sun Shade with Safety Hat

TO PROTECT useful eyes in the bright sunshine that lasts almost all year in the South, clip an eye shade into your safety hat. A common transparent green eye shade can be slipped in under the sweat band clips of the tin hat. It not only shades the eye but also makes things look a bit cooler.

By Robert J. Stapp, La.

TAKE THE LOAD OFF YOUR MIND
with Fairbanks®
STEEL-FRAMED
PLATFORM TRUCKS
FAIRBANKS
Load 'em high...treat 'em rough...Fairbanks steel-framed trucks always come back for more. Tough select oak platform, bolted to a sturdy steel frame, mounted on famous smooth-running Fairbanks swivel casters...give you low cost service, mile after year after year.
Series 21 LOCK-WELD SWIVEL CASTERS eliminate the greatest cause of caster failure: the king pin.
Fairbanks Steel-framed HAND TRUCKS...a type for every purpose...in every industry.
THE Fairbanks COMPANY
393 LAFAYETTE STREET • NEW YORK 3, N.Y.
Branches
New York 3 • Pittsburgh 22 • Boston 10 • Rome, Ga.

NEWS *for the South and Southwest*

Republic Flow Meters Co.

T. E. Bell . . . . . Sales Manager
T. Waldrop . . Manager, Atlanta Office

The appointment of THOMAS E. BELL as Sales Manager for the REPUBLIC FLOW METERS CO., has been announced by George S. Hendrickson, V. P. Mr. Bell joined the Republic organization in 1925 upon graduation from Georgia Tech with a B. S. degree in engineering. For the past 20 years, Mr. Bell has been manager of the Southern Territory with headquarters in Atlanta, Georgia. Previous to moving to Atlanta, he spent several years in the Chicago, Pittsburgh and Cincinnati district offices.

THOMAS WALDROP has been appointed to fill the vacancy left by Mr. Bell and will become manager of the Atlanta Office. Mr. Waldrop is a graduate of Alabama Polytechnic Institute and joined the Atlanta Office staff in January, 1951. Before joining the Republic organization, he was with the Babcock and Wilcox Co., after spending three years in the U. S. Navy.

Viking Pump Company Opens Atlanta Service Operation

VIKING PUMP COMPANY, Cedar Falls, Iowa, has opened a new warehouse and repair service operation at 1214 Spring St., N.W., Atlanta, Georgia. C. W. DOWNING, head of the Atlanta office, is manager of the new service, which covers the states of GEORGIA, ALABAMA, eastern TENNESSEE, the CAROLINAS, and FLORIDA.

A complete stock of petroleum handling pumps, LP-gas pumping equipment, and general application pumps will be available from this new center, in addition to complete service facilities.

This is the second Southern warehouse and repair service established by Viking during the past 14 months.

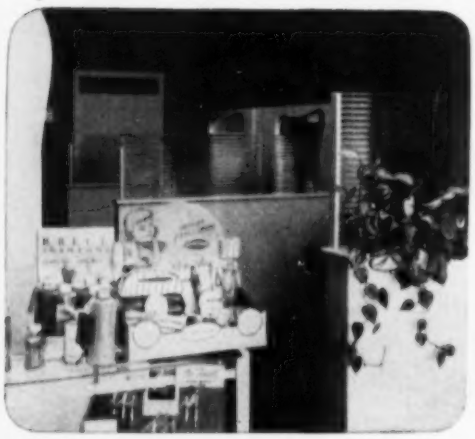
In early 1952 a similar operation was established at 2175 W. Commerce, Dallas, Texas, with O. W. PHILLIPS as manager.

Jeffrey Opens Tenn. Office

JEFFREY MFG. CO., 898 North 4th St., Columbus 16, Ohio has opened a Conveyor Division office at 1848½

New Shopping Center Uses FRICK Air Conditioning Throughout

The eleven stores in the big new Freedom Shopping Center in Baltimore, built and owned by Henry J. Knott Enterprises, are all kept cool and comfortable with Frick Unit Air Conditioners. Several of these are tied-in with heaters for year-'round use. Installation by the Paul J. Vincent Co., Baltimore Distributors who have put Frick Air Conditioning in over 100 theatres.



Frick Units, like this one in the Beauty Salon, Air Condition all the Shops at Freedom Center.

Frick Refrigerating and Air Conditioning Equipment can solve YOUR cooling problems equally well. Write

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.
Also Builders of Power Farming and Sawmill Machinery

West Cumberland Ave., KNOXVILLE, TENNESSEE.

EARL J. WOLTZ, who has had fifteen years service with the company, has been transferred from Harlan, Kentucky to Knoxville as District Manager.

Johnston Names Cross, S.E.

REX CROSS has recently been appointed District Manager for the Southeastern States by JOHNSTON PUMP COMPANY of Pasadena, California, manufacturers of vertical turbine and propeller pumps. His territory extends from Louisiana to the Atlantic Coast as far north as Arkansas, Tennessee and North Carolina.

Mr. Cross was for many years head of the Pump Division of the San Antonio Pipe and Supply Company of San Antonio, Texas. He is making his headquarters in New Orleans.

FUTURE EVENTS
Of Engineering Interest

NATURAL GASOLINE ASSOCIATION OF AMERICA, Wm. F. Lowe, Sec'y, 422 Kennedy Bldg., Tulsa 3, Okla.
April 29-May 1, 32nd Annual Convention, Rice Hotel, Houston, Texas.

INTERNATIONAL PETROLEUM EXPOSITION, Wm. B. Way, Gen. Mgr., Box 5246, Donaldson Station, Tulsa, Okla.
May 14-23, Exposition, Tulsa, Okla.

MATERIALS HANDLING SHOW, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
May 18-22, Fifth National Materials Handling Exposition and Conference, Convention Hall, Philadelphia, Pa.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, Oil & Gas Power Division, O. B. Schier II, Meetings Mgr., 29 West 39th St., New York 18, N. Y.
May 25-28, 25th Annual Conference and Exhibit, Schroeder Hotel, Milwaukee, Wis.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, George W. Craigie, Sec'y, 220 East 42nd St., New York 17, N. Y.
June 9-11, Meeting, Atlanta Biltmore Hotel, Atlanta, Georgia.

EXPOSITION OF BASIC MATERIALS FOR INDUSTRY, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
June 15-19, Exposition and Conference, Grand Central Palace, New York 17, N. Y.

AMERICAN WELDING SOCIETY, National Secretary, 33 West 39th St., New York 18, N. Y.
June 16-19, National Spring Technical Meeting with Welding and Allied Industry Exposition, Shamrock Hotel and Hall of Exhibits, Houston, Texas.

EVERLASTING
Boiler Blow-off Valves...
Teamed Up For "EVERLASTING" Service

The unique service qualities of EVERLASTING Blow-off Valves have long been demonstrated in boiler-rooms throughout the country. Now their superior design features have been teamed up in these EVERLASTING Duplex Blow-off Units.

HERE'S WHAT YOU GET WITH THESE DUPLEX UNITS

Valve shown on left of unit

- Lever- or wheel-operated types—as you desire
- Unrestricted flow — straight-through
- Rotating sliding disc—self-grinding, self-lapping
- Drop-tight seal—improving with use
- Non-wedge action—no sticking, no jamming

Valve shown on right of unit

- Straight-way or angle types to select from
- Strength to withstand repeated shock of blow-off force
- Exceptional resistance to erosion, abrasion and rust
- No pockets to permit lodgment of solids
- Positive action, self-cleaning

Not only do these EVERLASTING Duplex Blow-off Units provide an absolutely drop-tight seal—they are so constructed that long and repeated operation will not affect this tightness. Other Duplex Units for varied requirements are shown in our Bulletin.

Either valve of any EVERLASTING Duplex Unit can be supplied separately. But for boiler blow-off applications, any one of the complete EVERLASTING Duplex Units assures absolute safety—at low maintenance cost.

Ask your distributor — or write directly to us — for complete information.

EVERLASTING VALVE CO., 49 FISK STREET, JERSEY CITY 5, N. J.

EV 328A

Everlasting Valves

Trade-Mark "EVERLASTING" REG. U.S. PAT. OFF.

for everlasting protection

Black & Decker Expands, Md.

THE BLACK & DECKER MFG. CO., TOWSON, MD., will build immediately a 126,800 sq ft addition to more than double the present size of the Hampstead, Md., plant.

Final completion is scheduled for November. However, it is expected that the new addition will go into partial operation as early as September. The addition will not generally affect the main plant at Towson which will remain, as before, the center of activities.

C. H. Leibfried Mfg. Corp. South and Southwest Repr.

C. H. LEIBFRIED MFG. CORP., 95 Guernsey St., Brooklyn 22, N. Y., manufacturer of power piping rests and hangers, is represented in the Southeastern States by IRA PULASKI, with headquarters at 2025 Peachtree Rd., N. E., ATLANTA, GEORGIA.

GULF STATES DIST. CORP., 4003 Westheimer, HOUSTON 6, TEXAS, represents the company in the Southwest. ROBERT H. WHITE and L. G. WHITFIELD, sales engineers with Gulf States Dist. Corp., serve industrial, power, and service accounts in that area.

LOOK FOR THESE FEATURES IN STEEL GRATING

1. STRENGTH
2. SAFETY
3. LOW UPKEEP
4. LONG LIFE
5. SELF-CLEANING

BLAW-KNOX ELECTROFORGED® GRATING gives you all five

Regardless of what features are most desirable for your steel grating, you get what you want when you specify "Blaw-Knox." Its electroforged, one-piece construction provides exceptional *strength*, and the twisted cross bars give you a *safe* walking surface. The clean-cut openings—without angle irons—make it *self-cleaning* and easy to paint . . . contribute to *low upkeep*. Blaw-Knox Steel Grating has *long life* because there are no holes or crevices to trap moisture and encourage corrosion. Get the complete story on Blaw-Knox Grating and Stair Treads—write for Bulletin 2365 today.

We factory-fit Blaw-Knox Grating to your dimensions for easy installation.

Grating Department
Blaw-Knox Equipment Division
BLAW-KNOX COMPANY
2034 Farmers Bank Bldg., Pittsburgh 22, Pa.

BLAW-KNOX ELECTROFORGED® STEEL GRATING

J. J. Finnigan Opens Three Branch Offices

W. J. MCALPIN, president of the J. J. FINNIGAN CO., Atlanta, Georgia, has announced the opening of new branch offices in LITTLE ROCK, JACKSONVILLE, and MIAMI. The 65 year old company fabricates aluminum, copper, stainless steel, and stainless clad tanks, heaters, cyclonic separators, hot water generators, transformer tanks, air compressor tanks, etc.

The Finnigan Little Rock office will be managed by A. G. CROTHERS, previously a sales engineer with the Crane Company for twenty-five years. Mr. Crother's office will cover all of the state of Arkansas and Shreveport, Louisiana.

George A. Israel, Jr.

The Jacksonville office will be managed by GEORGE A. ISRAEL, JR. Mr. Israel is an engineering graduate of the University of Florida, was mechanical engineer for the W. P. Thurston Co. of Richmond, Virginia and since 1946 has been with John C. Pastor.

Roy H. Cogburn

ROY H. COGBURN will have charge of the Miami office. Mr. Cogburn also spent several years with John C. Pastor. He was with the Fread A. Rankin Oil Co., Jacksonville and previous to that connection served as purchasing agent for the Horne Wilson Co., Jacksonville.

In Atlanta, Mr. McAlpin also announced that plans were under way for immediate opening of additional J. J. Finnigan offices in both Charlotte, N. C. and New York City, N. Y.

H. Clay Moore and Associates Atlanta, Georgia

H. CLAY MOORE and ALLEN W. RIPLEY, formerly operating as Moore-Broach Engineering Co., have now changed their trade style to H. CLAY MOORE AND ASSOCIATES.

They will continue their same representation of Custodis Chimneys, which account they and the late H. Clay Moore, Sr., have had over a 50-year period. They also represent Sturtevant Mechanical Draft division of Westinghouse, The Beaumont-Birch Co. on ash and coal conveying systems, and Bigelow-Liptak on suspended walls and arches, all in the Southeastern States. In addition, they represent Ric-wiL on underground steam distribution, in Georgia.

H. Clay Moore, Jr., now on military leave with the Air Force, will rejoin the firm on completion of his service period, and will be the third generation of that name in this same business.

Offices will continue to be maintained at 207 Walton Bldg., Atlanta 3, Ga.

Head of McBurney Stoker & Equipment Co. Dies

WILLARD P. MCBURNEY, founder of the MCBURNEY STOKER & EQUIPMENT CO., 2110 Peachtree Road, N.W., ATLANTA, GEORGIA, died at his home on March 30.

Mr. McBurney attended Stephens Institute of Technology in Hoboken, N. J., and was a member of the American Society of Mechanical Engineers. He was a trustee of Oglethorpe University, and was active in Atlanta civic affairs.

Crane Manufacturer Changes Name

Mr. Paul W. Pearson, President of the INDUSTRIAL EQUIPMENT CO., 315 N. Ada Street, Chicago 7, Illinois, nationally known manufacturer of overhead cranes, jib cranes and monorail systems, announces that the firm name has been changed to INDUSTRIAL CRANE & HOIST CORPORATION.

The firm name has been changed to better identify Industrial Crane & Hoist Corporation with the cranes, runways and hoists that it engineers, manufactures and sells throughout the United States.

Laboratory demonstration shows foaming of highly alkaline solution in glass test cylinder.

Same solution after addition of 12 ppm of Bird-Archer Concentrol antifoam.

CONCENTROL

LOW COST CHEMICAL METHOD

FOR CONTROLLING FOAM

AND BOILER WATER CARRYOVER

◀ **LABORATORY PROOF**

● Tests and plant operating records in all parts of the country have established the effectiveness and economy of Concentrol chemical treatment to combat wet steam problems. Where boiler water carryover is caused by foaming due to high alkalinity and high proportion of dissolved solids in the water, Concentrol is essentially a surface active agent that causes breakdown of bubble film, preventing foam formation.

Concentrol is supplied in liquid, powder or briquette form—can be fed either continuously or in slugs to boilers. Formulations of Concentrol can include organic sludge conditioning agents and other water treatment chemicals for boiler treatment as well as antifoam. Concentrol eliminates the need for costly pre-treatment of water and high blow-down rate. It is fast acting and resistant to hydrolysis or breakdown under normal boiler temperatures and pressures.

A Bird-Archer 8 Point Service Engineer is as near as your phone. For friendly counsel call him or write directly to Bird-Archer outlining the details of your boiler operations.

Engineering plus Chemistry equal Bird-Archer Service

LABORATORIES · ENGINEERS · CHEMISTS

BIRD-ARCHER WATER TREATMENT

THE BIRD-ARCHER COMPANY, 4337 NORTH AMERICAN ST., PHILADELPHIA 40, PA.

NEW YORK • CHICAGO

IN CANADA: The Bird-Archer Co., Limited, Cobourg, Ontario

IN MEXICO: Calderas y Accesorios, S. A., Amsterdam 291, Mexico, D. F.

news (continued)

Republic Rubber SW District

The formation of a new Southwest District of the REPUBLIC RUBBER DIVISION, LEE RUBBER AND TIRE CORPORATION, Youngstown, Ohio, has been announced.

W. T. WILLEY, formerly Field Representative in Houston, has been appointed District Manager with headquarters in TULSA, OKLAHOMA.

Other members of the new district sales organization who will be responsible for the sale and service of Republic's line of belting, hose and packing are R. J. CRAVENS with headquarters in DALLAS; D. L. CUSHING in HOUSTON, and R. E. MCQUISTON in MIDLAND, TEXAS.

Westinghouse Branches—S. E.

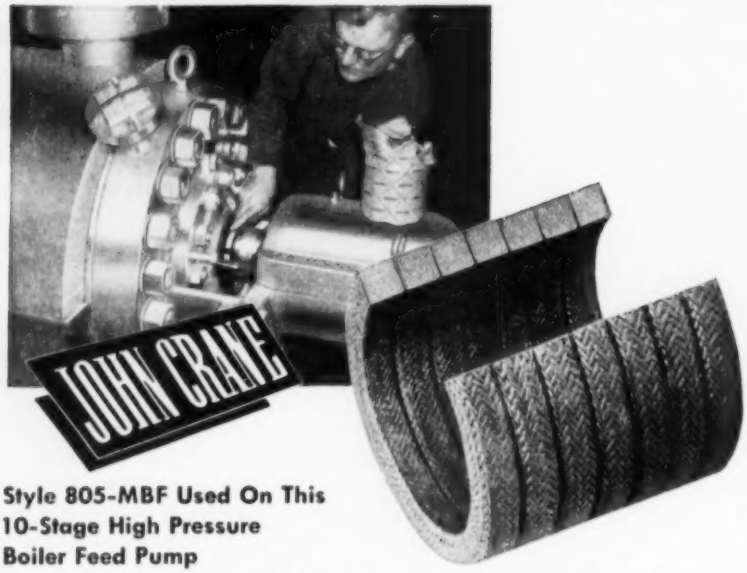
O. O. RAE, manager of WESTINGHOUSE ELECTRIC CORPORATION'S Southeastern District with headquarters at ATLANTA, GA., has announced the establishing of an Atlanta branch office.

THOMAS FULLER, JR. was appointed branch manager. Mr. Fuller joined Westinghouse in 1935 upon graduation from the Georgia Institute of Technology. Since March, 1948 he has been manager of the Chattanooga, Tenn. branch office.

M. A. LAND is sales supervisor and S. M. MORTON is office manager. GEORGE W. MILLER was appointed distribution apparatus manager. T. J. WOTH was named Atlanta branch engineering manager, and G. W. ALEXANDER is branch service manager.

J. J. HILL was appointed manager of the CHATTANOOGA, TENN. office to replace Mr. Fuller. E. P. ATHENS has been named manager of the JACKSONVILLE, FLA. office. A new office was established at GREENVILLE, S. C., with J. H. REEVES as manager.

Take a good look at this critical PACKING INSTALLATION...



Style 805-MBF Used On This 10-Stage High Pressure Boiler Feed Pump

This set of packings is going to handle a tough job. The pump is rated at 965 gpm, 4250′ total head, handling *hot* (312°F.) boiler feed water at 89# suction pressure and driven by a 3850 rpm induction motor (shaft sleeves are chrome plated—675 Brinell).

There are many styles of "John Crane" Packings—but Style 805-MBF was recommended and used because it was developed *and developed alone* for high speed centrifugal boiler feed pumps. The natural lubricating characteristics in the design of the monel and asbestos yarn braid-over-braid construction makes it a strong, wear resistant packing. Used in hundreds of installations all over the world—it has proved to be a highly efficient, long-life, trouble-free packing that gives you the results you want.

For quick action, let our Engineering Department help you. Write for latest "John Crane" Packings Catalog. Crane Packing Company, 1839 Cuyler Avenue, Chicago 13, Illinois.

JOHN CRANE CRANE PACKING COMPANY

Goodyear Names Mabry—Ga.

SAMUEL J. MABRY has been appointed ATLANTA, GA., district manager, Industrial Products division of GOODYEAR TIRE & RUBBER CO.

Samuel J. Mabry

Mabry, who has been an industrial products representative for Goodyear since 1948, replaces John E. Ragan, deceased.

Eutectic—Birmingham, Ala.

EUTECTIC WELDING ALLOYS CORPORATION, 40-40 172 St., Flushing, New York, N. Y., has announced the opening of a new Southern Divisional Office, Brown-Marx Building, BIRMINGHAM, ALABAMA. CHARLES BROWN is Divisional Sales Manager.

Boston Gear Works Appoints Briggs-Weaver—Texas

THE BOSTON GEAR WORKS, Quincy, Massachusetts, manufacturers of power transmission equipment and component parts, recently appointed the BRIGGS-WEAVER MACHINERY CO. of DALLAS, HOUSTON and FORT WORTH, distributor of its complete line. Complete stocks maintained in Dallas and Houston include many items from instrument gears to heavy industrial gears — sprockets, speed reducers, ratio motors, ball bearings, collars, couplings and pulleys.

WBMA Meets in Florida

THE WIREBOUND BOX MANUFACTURERS ASSOCIATION held its annual meeting in Boca Raton, Fla., March 4-7. JOSEPH A. SOWELL of BREWTON, ALA., was reelected president.

Among directors reelected are S. J. ADKINS, GAINESVILLE, FLA.; L. O. CROSBY, JR., PICAYUNE, MISS.; J. R. MILLER, JR., BREWTON, ALA.; SHELLEY SCHUSTER, NEW ORLEANS; and D. R. SIMMONS, BAINBRIDGE, GA.

John B. Moore Corp. Repr.

JOHN B. MOORE CORPORATION, P. O. Box 3, Nutley 10, N. J., has announced the appointment of the JAMES B. SCHOOLER COMPANY, 2008 Baltimore St., KANSAS CITY, MO., as sales representative for KANSAS, OKLAHOMA, and western MISSOURI.

Petro Transfers Moore to Va.

PETRO, 3170 W. 106th St., Cleveland 11, Ohio, has announced the transfer of LEONARD V. MOORE, who for the last two years has been connected with the company's ATLANTA sales engineering office, to RICHMOND, VIRGINIA.

Moore continues, also, as a direct factory representative for the company's oil-burning equipment.

Thor Power Tool Co. Name

Independent Pneumatic Tool Company, Aurora, Ill., has changed its sixty-year-old corporate name to THOR POWER TOOL COMPANY.

The trade name "Thor" has been used as identification of the firm's power tools since 1893 and the new name utilizing the trade mark will eliminate confusion and facilitate easier recognition of the company's products.

Corpus Christi Engineers

THE CORPUS CHRISTI ENGINEERS CLUB is located at 1522 South Staples Street, CORPUS CHRISTI, TEXAS. The front part of the building is used for Club offices, and office space for manufacturers representatives. The large room in the back of the building is used by engineering societies for dinner meetings.

Members of the Board of Directors of the Corpus Christi Engineers Club are: W. W. MCCLENDON, president; DUANE ORR, vice-president; M. H. ALLEN, JR., secretary-treasurer; W. M. GOLDSTON, JESSE R. LAURENCE; R. C. DILL; HOMER INNIS; WALLACE RAIRIGH; and H. L. SCOTT.

Carl E. Johnson Dies; Sterling Motors Founder

CARL E. JOHNSON, prominent California manufacturer, died March 26, at his home in San Marino, California. Mr. Johnson was one of the founders of Sterling Electric Motors, Inc., one of the country's leading manufacturers of electric power drives.

In 1906 Mr. Johnson organized the first company on the West Coast for the manufacture of electric motors and generators. During the period from 1906 to 1927, Mr. Johnson made a great many major technical contributions to the electric motor field, being directly responsible for approximately 30 patents for such developments as electrically driven deep-well turbine pumps, die casting of induction motor rotors, across-the-line starting motors, induction motors with magnetic bridges, waste packed bearings for motors, bi-metallic rotor for induction motors, weather-proof pump motor, flange motors, adjustable reactance strip rotors, variable speed squirrel-cage motors, water-cooled pump heads, and many others.

In 1927, Mr. Johnson, together with Earl Mendenhall and Allen A. Adams, organized and founded Sterling Electric Motors, Inc. Since 1927 Mr. Johnson added 25 patents on electrical apparatus to his already formidable list of inventions. These patents were for such outstanding developments as the Herringbone Rotor for silent motors, ventilating fan motors, shielded motor assemblies, variable speed units, motors for variable diameter pulleys, etc.

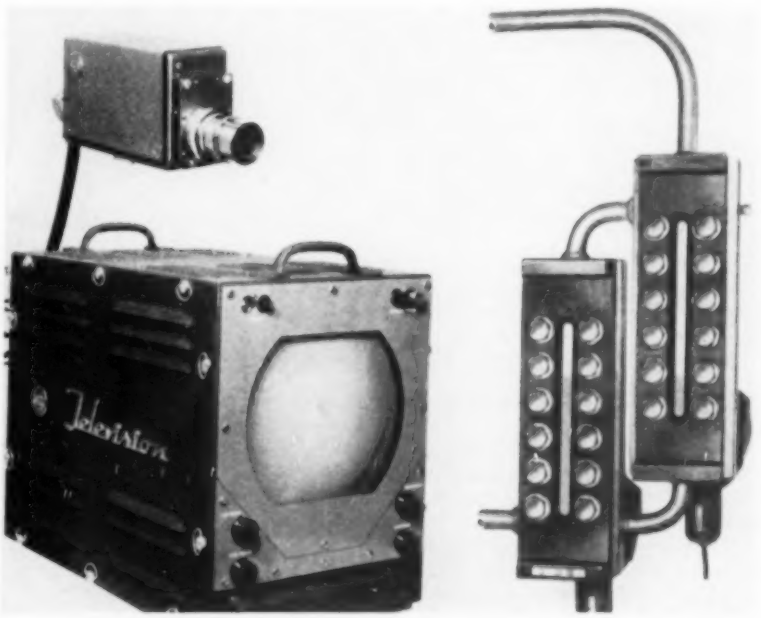
Yarway boiler water gages, brings "live" gage readings down to the operating panel or any other convenient location in the boiler plant. The television image is transmitted from the small, light-weight camera to the viewing monitor by a single cable.

The simplified two-unit chain is standard RCA equipment. The special camera base provided (see illustration below) also furnishes proper lighting of the Yarway gages.

Yarway pressure sealed flat glass gages are well-known through their wide application and successful service on high pressure boilers throughout the country.

RCA — Yarnall-Waring Television Arrangement

A new application of RCA's Industrial Television to installations of



WATCO

ROOF COOLING SYSTEMS can keep your workers at top efficiency through more comfortable summer working conditions.

● If you're interested in an efficient, simple and economical way of cooling your plant this summer, get information *now* on the WATCO method of roof cooling.

Here is a tried and proved way to lower inside temperature of your plant from 10° to 15° F., assuring far greater worker efficiency because of more comfortable conditions.

No large initial capital investment in air conditioning units is necessary. Maintenance and operating costs are exceedingly low. WATCO offers you a simple system of spraying your roof with water . . . waste water if available . . . that can be easily installed either by us or by your own plant maintenance men. Ask for the names of a few of the many representative industrial plants using the WATCO system.

● *For further information write for our Bulletin #20 and supplementary Bulletin #20A.*

WATCO WATER COOLING CORPORATION

ENGINEERS and CONTRACTORS

71 NASSAU STREET NEW YORK 38, N. Y.

Two of these 32 ft, 33,000 lb capacity Fruehauf trailers carried the Yale & Towne materials handling road show throughout the South and Southwest. Equipment included gasoline and electric lift trucks, special attachments, a variety of hoists and a crew of seven.

Materials Handling Road Show Completes Southern Schedule

YALE & TOWNE MANUFACTURING COMPANY'S traveling materials show "hit the road" February 24th in Miami, Florida, and recently completed performances in several cities in Louisiana, Texas, Oklahoma, Tennessee, Georgia, Alabama, North Carolina, Virginia, and Maryland. It will be at the Materials Handling Show in Philadelphia, May 18-22nd.

Stars of the show are the latest types of materials handling equipment in acts which demonstrate the strength and dexterity of the trucks, hoists, and attachments. Although the show is planned to demonstrate to plant engineers and managers how they can use Yale equipment, the acts have an entertainment appeal for all.

Safety features of all Yale electric trucks are demonstrated. When the operator leaves the truck, the seat rises automatically thus cutting off all power and applying brakes instantly. Another demonstration shows how gasoline powered fork-lift trucks can be operated inside buildings when they are equipped with an OCM Catalytic Muffler which oxidizes carbon monoxide from the exhaust, converting it into harmless carbon dioxide.

Factory Chimneys

(*Starts on page* 82)

a masonry chimney, prevent sulphates in the pores of the brick and mortar, which have been formed by reaction of the acids and the mortar, from taking on water of crystallization. Such crystallization produces large expansive forces which will result in cracks and spalling, and may eventually dislodge individual bricks especially at the top of the chimney.

In a similar manner water, which has entered the pores of the brick and mortar, will expand on freez-

ing and add to the destructive effect of "sulphation."

In the case of a steel stack, corrosion of the inner surface is retarded by covering an unused stack.

Thus a chimney out of service and not properly covered will deteriorate much more rapidly than a chimney constantly in service.

Heating Cold Chimney

It is wise to heat a cold masonry chimney slowly in order to avoid cracking due to thermal shock. This is particularly true in the case of new chimneys being placed in service. On completion of a new masonry chimney, the builder provides the owner with instructions for drying out the chimney and placing it in service. It would be well for the plant superintendent to retain these instructions for use in placing the chimney in service after a possible future shut-down.

Summary

In summary the following points are suggested as a guide for good chimney care:

1—Have your chimney inspected at regular intervals. Look at it yourself from time to time and take prompt action if any irregularities are noticed.

2—Employ only reputable chimney concerns to make inspections and to perform maintenance and repair work or alterations.

3—Keep the bottom of the chimney clean and free from accumulation of soot at all times.

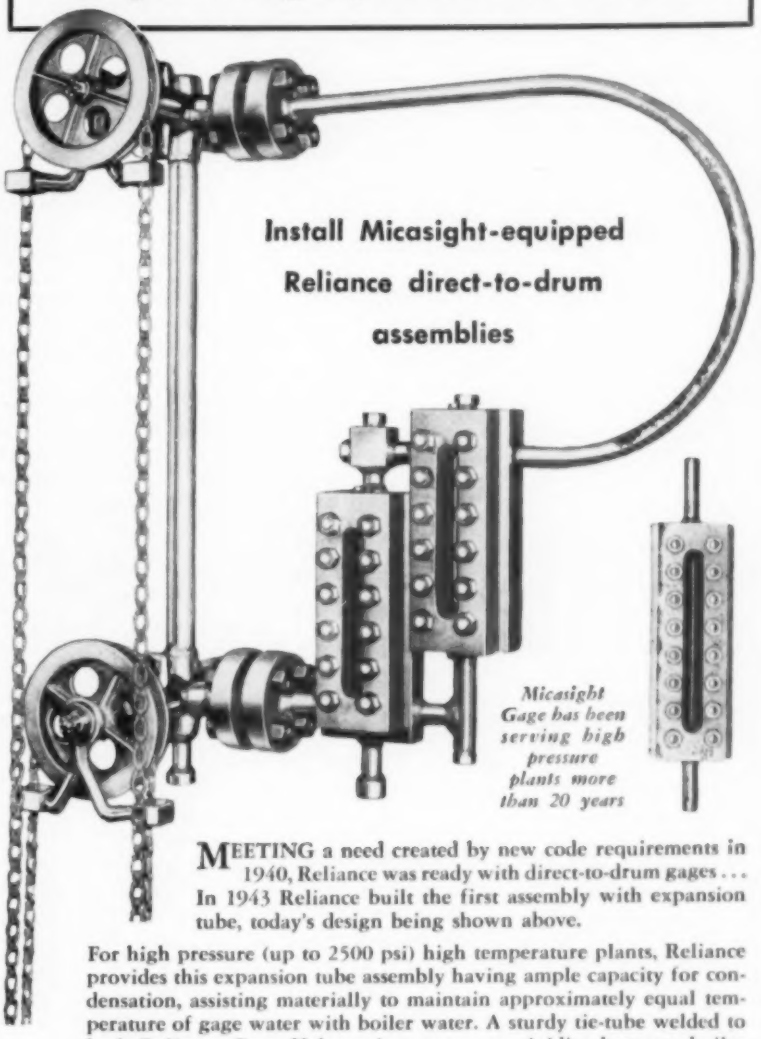
4—Use the chimney only for the purpose for which it was designed. If it is to be put to another use, have the proper alterations made.

5—Place your chimney in service slowly.

6—Cover your chimney if it will be out of service for an appreciable length of time.

As in the case with most items of equipment, neglecting a chimney is, in the long run, "penny wise and pound foolish." Proper care and maintenance of a factory chimney is amazingly inexpensive provided it is a continuous policy. There are many factory chimneys built over half a century ago that are still giving good service. It is good business, as well as good plant practice, to take care of your chimney.

Stop gage glass breakage on your high pressure boilers


Install Micasight-equipped
Reliance direct-to-drum
assemblies
Micasight Gage has been serving high pressure plants more than 20 years

MEETING a need created by new code requirements in 1940, Reliance was ready with direct-to-drum gages . . . In 1943 Reliance built the first assembly with expansion tube, today's design being shown above.

For high pressure (up to 2500 psi) high temperature plants, Reliance provides this expansion tube assembly having ample capacity for condensation, assisting materially to maintain approximately equal temperature of gage water with boiler water. A sturdy tie-tube welded to both Reliance Gage Valves gives necessary rigidity between boiler connections. Reliance all-welded gage assemblies have more than sufficient ruggedness to meet severest conditions.

Extra gage-reading safety and long window life is assured by the exclusive Micasight Gage which uses non-shattering mica windows securely clamped in short, wide-bar, non-breathing bodies. Reliance provides access to clean out all passages, with entrances guarded by non-freezing plugs. Gage is connected to valves by ring-joint flanges — no nipples or packing glands. The Micasight is the safest water gage known. *Write for full information, to the factory or your nearest Reliance representative.*

RELIANCE GAUGE COLUMN CO., 5902 Carnegie Ave., Cleveland 3, Ohio

Reliance®

BOILER SAFETY DEVICES

ALBANY

a time tested line of lubricating products

ALBANY LUBRICANTS

ALBANY PRESSUREGREASE UNIVERSAL
For Cups — Ball Bearings — Water Pumps — Universal Joints. Waterproof — Exceptionally high melting point. Soft enough for gun application.

ALBANY GREASE
A cooling lubricant for operating temperatures from 110° F to 200° F.

ALBANY PRESSUREGREASE
A superior waterproof mineral oil grease of high viscosity. Comes in Liquid, Soft, Medium, Hard and Graphite Pressuregrease Soft and Medium.

ALBANY BEARING LUBRICANT
(Ball or Roller Bearing)
Will not separate or oxidize assuring long life to bearings. May be used in hand grease guns.

ALBANY GEAR LUBRICANTS
Retards wear, quiets gears. Waterproof. Will not drip when gears are idle or in motion.

ALBANY PENETRATING OILS
(Clear or Graphite)
Quick-acting. Cuts rust as well as lubricates. Loosens sticky valves, eliminates squeaks.

ELECTRICAL DIVISION

Albany RBR Wire Pulling Compound

Albany Improved Cable Pulling Compound

Stearine Candles & Flux

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Southern Representatives

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1312 Poinsetta Ave., Orlando, Fla.

J. H. MENGE CO.
932 Nat'l Bank of Commerce, New Orleans, La.

ADAM COOK'S SONS, Inc.
Mfrs. of Albany Lubricating Products
LINDEN, NEW JERSEY

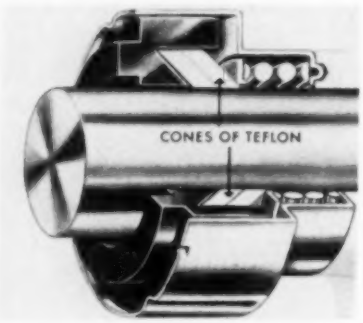
Maintenance Equipment and Supplies

Starts on page 8

Free literature on what's new in maintenance equipment and supplies is offered by leading manufacturers. For your free copy, circle the item number on one of the service post cards provided on pages 17 and 18.

Shaft Seal

E-7 CRANE PACKING CO., 1800 Cuyler Ave., Chicago 13, Ill., has announced a new all-purpose mechanical seal known as the "John Crane" Type 19, and said to provide life-time performance in small pumps, hot water circulators, and many other rotary shaft applications.



Special beveled cones made of Teflon (DuPont Trade mark for tetrafluoroethylene resin) are utilized as the flexible member. This adapts the seal for services involving water, oil, corrosives or acids; temperatures from —100F to +450F; vacuums and pressures to 200 psi; and high shaft speeds.

Being a packaged type unit, the seal provides quick and easy installation for production assembly and replacement service. It is presently available in sizes to fit shaft diameters of ¼, ⅜, ½, ⅝ and ¾ inches.

Anti-Rust Paint

E-8 SPECO, INC., 7308 Associate Ave, Cleveland 9, Ohio, has expanded its line of Rustrem anti-rust paints to include three new colors—red, gray and green, in addition to the standard black, aluminum and clear.

For use on all metals, both indoors and out, the new colors are said to eliminate the necessity for a clear base coat except where other paints are desired as finish coats. The paint can be applied right over rust without wire brushing, scraping or sandblasting. It is said to penetrate rust layers and adhere tightly to surfaces beneath, forming a tight seal which resists moisture, temperature changes, chemicals, acids and fumes.

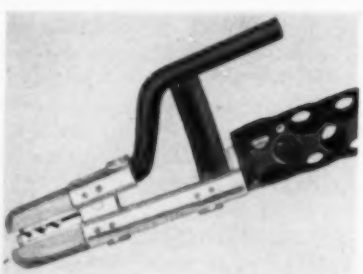
Dust Collector Cleaning

E-9 RESEARCH CORPORATION, Bound Brook, N. J., manufacturer of Cottrell electrostatic precipitators, has developed a new electrode rapping system which can be applied to new and existing standard precipitators in a wide range of gas cleaning applications.

Until now, most available types of electrode rappers have been mechanical or pneumatic. The new "Magnetic-Impulse" rapping system provides a continuous and uniform dust dislodging service, using solenoid actuated rappers that are energized by a low power consuming pulse generator. These rappers deliver continuous rapping impacts of light and automatically controlled intensities.

Electrode Holder

E-10 THE LINCOLN ELECTRIC COMPANY, 22801 St. Clair Ave., Cleveland 17, Ohio, has announced a new 400 ampere insulated electrode holder. The "Cooltong" holder has several patented features which field tests have proved to give longer service life and cooler operation than is normal with holders of similar capacity. It is claimed that in one test made with the holder, it remained cool enough to weld with bare hands when using 400 amperes current.



Guides for Cutting Torches

E-11 NEW ERA ENGINEERING CO., 458 West 29th St., Chicago 16, Ill., has announced development of a complete series of new, precision type cutting guides for individual gas flame metal cutting torches, such as are used by shop mechanics and field workmen in practically all branches of industry.

The guides are designed to provide the workman with simple, low-cost attachments that enable him to do accurate cutting—circles, straight lines, bevels, and sundry shapes—with no special training or skill. As emergency or standby equipment in any shop, they provide a means for quickly producing parts.

Made in styles to fit all makes of torches (from 70° to 90° models), the guides are of three principal types: a small circle guide for cutting circles from 1-15 in. diameter, a large circle guide for circles 10-66 in. diameter. A straight-line guide is available and can be arranged for straight and 60° or 45° bevel cutting. The guides can be attached to torches ready for use in 2 or 3 minutes' time; finger-tip adjustments need no tools.

Electric Sander

E-12 THE BLACK & DECKER MFG. CO., Towson 4, Md., is marketing a new portable electric sander for finishing operations on wood, metal, plastics, etc.

Known as the No. 88 Sander, this heavy-duty tool can be used for sanding down window sills, trim work, etc., prior to repainting; levelling wood, wall board or plaster wall joints and "feather-edging" painted surfaces on wood or metal.

A king-size bottom plate extending beyond the body of the tool permits sanding in close quarters, and right up to risers. The knob handle can be unscrewed and placed on either side or the front of the housing, for maximum operator comfort.

CONSIDER

STEAM TURBINES

AS MOTIVE POWER

TO OPERATE
COMPRESSORS
PUMPS
FANS
BLOWERS
WINCHES
GENERATORS
MIXERS
AND
SIMILAR
EQUIPMENT

HERE ARE THE ADVANTAGES:

VERSATILE DEPENDABLE: Wing Steam Turbines give an infinite range of speeds, easily controlled by throttling. Always on the job, you are completely *independent* of any electric power failure.

ECONOMICAL: Wing Steam Turbines cost little or nothing to operate where their oil-free exhaust steam can be used in process operations—or in space heating. The Turbine acts as a reducing valve . . . its exhaust steam has been reduced down to the pressures used in heating and cooking operations.

NO SPARKS: Wing Steam Turbines are especially desirable for operations involving explosive gases and flammable materials, where sparks could be dangerous.

SMOOTH ACCELERATION OR DECELERATION: Wing Turbines can be smoothly accelerated or slowed down to meet the needs of the process, fan, pump or other driven apparatus.

OPERATING RANGES:

Horsepowers to	150 b.h.p.
Temperatures to	750°F.
Pressures to	600 p.s.i.
Back Pressures to	50 lb.
Speeds to	4000 r.p.m.

WING Steam Turbines have been serving industry for over a half-century. They are known for their rugged construction, trouble-free operation, and long life.

Write us today about further information. And ask for Bulletin SW-1a.

Wing

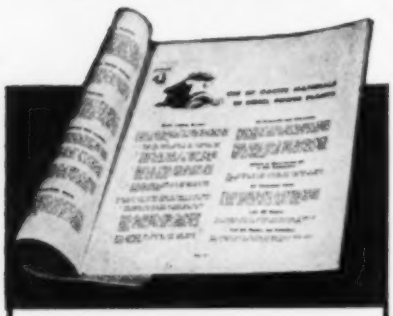
L. J. Wing Mfg. Co.

169 Vreeland Mills Road

Linden, New Jersey

Factories: Linden, N.J. and Montreal, Can.

FREE-



71 ways to save on maintenance cleaning

HERE'S a 16-page digest that's packed with tested Oakite procedures for power-plant maintenance-cleaning—procedures that pay off in thorough cleaning, degreasing, descaling . . . reduced cleaning time . . . increased equipment efficiency. Shows how to save money in steam control systems, electric and diesel power plants.

Gives you step-by-step details and diagrams for 71 specific jobs, such as

- In-place cleaning of heat exchangers
- Stripping paint
- Cleaning oil, air filters
- Descaling condensers
- Removing rust
- Cleaning and descaling transformers

Condenses for you the succcssful experience of many plant superintendents who get low-cost maintenance through Oakite materials and methods.

Get your FREE copy today. Write Oakite Products, Inc., 23A Rector St., New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Weed Killer

E-13 E. I. DU PONT NEMOURS AND CO., INC., Grasselli Chemicals Department, Wilmington 98, Delaware, has developed a new CMU Weed Killer which gives better results and saves on maintenance costs wherever weeds and grass are a maintenance problem, a fire hazard or simply a nuisance, because one application of 20 to 40 pounds per acre kills all weeds present and usually prevents new growth for a year or more.

CMU cuts out the costs of multiple sprays, mowing and hand cutting. Best results are obtained with an application before a rainy period and before weeds start to grow. The weed killer is non-flammable, non-corrosive to equipment, and comes as a wettable powder, ready to mix with water.

Dry Mix Asphalt Paint

E-14 BERRY ASPHALT COMPANY, Asphalt Specialties Division, Magnolia, Ark., has introduced Baromix, an asphalt base paint for industrial applications, suitable for brush or spray, and available in aluminum, tile red, forest green and black.

There is no waste, because it is packed in dry powder form and you mix only what is needed. The remainder in dry form will keep indefinitely and will not decompose or harden in the container.

It may be easily and quickly mixed with kerosene to any consistency required. It provides a permanent bond to metal, wood, concrete, or composition. Because of the asphaltic base, it offers exceptional resistance to weather, smoke, fumes and soil acids.

Tool Grinder

E-15 SOUTH BEND LATHE WORKS, 425 E. Madison St., South Bend 22, Ind., announces a new Pedestal Tool Grinder, built for ease of operation and trouble-free maintenance.

There is plenty of work room around the grinding wheels on the tool grinder, it runs with practically no vibration and the motor is protected from harmful abrasive dust. The grinder comes with either 8 in. grinding wheels and a ½ hp. motor or with 10 in. wheels and a ¾ hp. motor. Compactly built, it measures 49½ in. high, 18½ in. wide and 20½ in. deep.

Ladder Shoe

E-16 ROSE MANUFACTURING COMPANY, 1731 Arapahoe St., Denver, Colo., has developed the "Safe-Hi" Ladder Shoe, which will hold under many varied surface conditions.

Rubber in the shoe tread enables the ladder to hold firmly on all dry surfaces, the cord in the tread holds the ladder securely on all wet surfaces, the straight ridges in the tread act as a series of squeeges to hold the ladder securely on greasy or soapy surfaces, and the "self-sharpening" spike can be snapped into place to hold the ladder securely on snowy or icy surfaces.

Sheet Metal

E-17 ILLINOIS ZINC COMPANY, 2959 W. 47th St., Chicago 32, Ill., is now putting up a copper hardened sheet zinc—in prepackaged rolls for over-the-counter sale.

The metal, known as "Eraydo Alloy," is light enough to permit easy cutting and forming with tools found in the average workshop. Being principally zinc, it is very easy to solder.

Flame Cutting Machine

E-18 VERNON TOOL CO., LTD., Alhambra, California, announces a precision flame cutting machine for reworking, reconditioning, and salvaging all types of new and used welding ells, tees, flanges, reducers, etc.

The manufacturer claims that the "Universal" Flame Cutter will cut ells to any angle, shorten ells, tees, flanges, reducers, and will re-cut and bevel used ells, tees, swedges and returns. Additional uses for the tool are: cutting small miters-22½ degrees or less, cutting holes in blanks for slip-on reducing flanges, making swedges out of welding caps, and cuttings and beveling short pieces of pipe up to 36 in. diameter.

Micro-Fog Lubricator

E-19 C. A. NORGREN CO., 3400 South Elati St., Englewood, Colo., has introduced a newly designed micro-fog lubricator featuring constant oil level, oil feed control by air flow, and 360 degree visibility of oil feed.

Function of the lubricator is to produce an extremely fine and uniform air-borne oil fog at low air flow; to transmit it over greater distances and distribute it evenly through multiple outlets; to provide exact control and uniform rate of oil feed under all operating conditions.

The device is especially designed for lubrication of one or more high-speed spindles, bearings, gear boxes, small air tools and similar equipment, for ¼ in. air lines. Rated air requirements are from 0.8 cfm at 10 psi to 6 cfm at 80 psi. Maximum safe operating pressure is 150 psi and maximum safe temperature is 120 F.

You'll SAVE Muscles and Money with Darts!

This True Ball Joint Makes the Difference

Dart seats are wider and spherically ground to a true ball joint. You get a *drop-tight* joint without excessive wrenching. Yes, and you can use Darts over and over again to cut your costs!

QUICK FACTS

- 2 BRONZE SEATS resist pitting and corrosion — stay serviceable year after year
- HEAVY SHOULDERS built to take severe wrenching
- NUT AND BODY of practically indestructible, air-refined, high test malleable iron
- THREADS full, clean-cut and hard. They won't deform or strip

Be sure to say "Darts" to your supplier. They'll save you money and maintenance headaches over the years.

DART UNION COMPANY
Providence 5, Rhode Island
The Fairbanks Co. — Distributors
Boston • New York • Pittsburgh • Rome, Ga.

DART UNIONS

MARTINDALE

COMMSTONE HOLDER

Holds Commstones rigid and true for concentric resurfacing of commutators and slip rings while running at normal speeds in their own bearings. Grinds commutators 4½ to 43/4" wide. Used with two Commstones in stone holder or one Commstone in 2" box.

WIRE CREEPER

A new, speedy method of stringing additional overhead wires over houses, through trees, across congested areas, etc., by means of a remote controlled creeper that carries cord from one pole to next on available wire.

MICA-MILLER

A powerful, light-weight, low cost, easy to use Undercutter, operating from 1/5 h.p. Universal motor. Available with small, medium or heavy duty head (interchangeable). Also available with air motor, or flexible shaft drive.

Write for New 64-page Catalog No. 29 describing these and many other products for Industrial Maintenance, Safety and Production.

MARTINDALE ELECTRIC CO.

1334 Hird Ave. Cleveland 7, Ohio

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Cleaning Spray

E-20 KELITE PRODUCTS, INC., 1250 N. Main St., Los Angeles 12, Calif., is producing a new industrial cleaner to be applied by a hand-sized pressure spray gun.

The Kelite Spray White removes grease, oil, wax, gums, dirt, dye, ink, cutting soap, light carbon and other substances, with safety to all metals, plastics, rubber, porcelain, composition, concrete or wood when used according to directions. The product is said to accomplish rapid cleaning without heat, odor, fumes, solvents, fire-hazard or danger to skin. Cleaning operation consists of merely spraying on and wiping off Spray White.

Septic Tank Treatment

E-21 RELIANCE CHEMICALS CORPORATION, P. O. Box 6724, Houston 5, Texas, has developed a dry stable powder of preserved micro-organisms together with their enzyme systems, called "Bionetic," and used in the treatment of sanitary sewage or industrial wastes.

Bionetic is said to be improving the operation of septic tanks or other waste treatment facilities in industrial plants beyond the city sewer lines. According to the manufacturer, it reduces the amount of sludge in septic tanks by 60 to 70 per cent or more. It increases the settling of sewage and reduces the carry-over of solids into the tank effluent.

Painting System

E-22 THE PENNSYLVANIA SALT MANUFACTURING CO., 1000 Widener Bldg., Philadelphia 7, Pa., has introduced a new system of anti-corrosion coating using specially formulated neoprene coatings.

The new system is said to have resulted in savings up to 50 per cent in the maintenance painting and coating costs in the Pennsalt plants.

The special formulations are NeoCoat and NeoPrime A (for all surfaces except concrete) and NeoPrime B (for concrete surfaces).

NeoCoat is a true plastic, involving polymerization, in which the accelerator is included in the product, thus eliminating the necessity of mixing on the job. The polymerization takes place after the coating is applied.

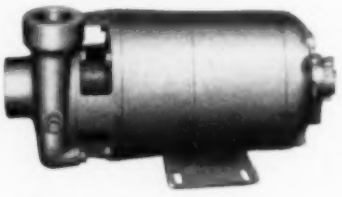
Volt-Ammeters

E-23 PYRAMID INSTRUMENT COMPANY, INC., Lynbrook, N. Y., is making available a series of three pocket-size volt-ammeters, in a range that measures up to 1200 amperes.

The three Amprobes will particularly interest men involved in the maintenance of electrical equipment and distribution systems. Their "snap-around" construction permits these Amprobes to measure current instantly, without being connected to the conductor. The reading can therefore be taken without interrupting the circuit or shutting down equipment, making the following checking jobs much quicker and easier: determining load conditions, checking motor overloads, balancing loads, locating grounds, tracing shorts, checking upon windings in motors, checking voltage losses, checking out controllers, etc.

Centrifugal Pump Design

E-24 CARVER PUMP CO., Muscatine, Iowa, is producing small, close-coupled, motor driven centrifugal pumps, which are made in two sizes (1 in. and 1¼ in. discharge), and which will pump up to 70 gpm, heads up to 110 ft.



The pumps incorporate mechanical shaft seals, stainless steel shafts, enclosed bronze impellers, and heavy duty ball bearings. They are close-coupled to continuous duty jet pump motors.

Applications include general service or as integral parts of air conditioning units, cooling towers, hot water circulators, etc.

Extreme Temperature Grease

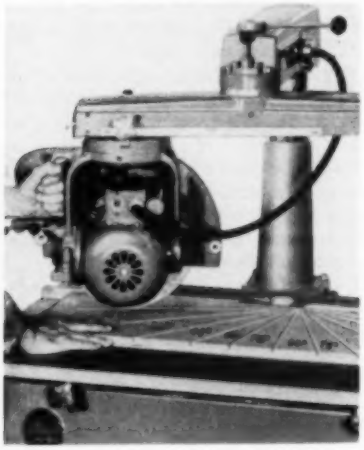
E-25 THE ALPHA CORPORATION, 179 Hamilton Ave., Greenwich, Conn., announces a new grease consistency mixture for extreme bearing pressure lubrication at temperatures ranging from —40 F to approximately 400 F.

Molykote, type U lubricant is identical to the type G, except that instead of a petroleum lubricant being utilized as a carrier, polyalkylene glycol is used instead.

Type U is particularly adaptable for use in extreme temperature applications. It can be used for temperatures up to approximately 800 F, in which case the carrier evaporates, leaving the Molykote powder impregnated on the surface for lubrication. It has great resistance to sludge, gum or varnish formation and is compatible with practically all materials, including natural and synthetic rubber, leather, etc.

Radial Saw

E-26 ROCKWELL MFG. CO., Delta Power Tool Division, 400 N. Lexington Ave., Pittsburgh 8, Pa., has announced the new Delta 12-14" Radial Saw, which has a saw arm that swivels 360 degrees in all directions; yoke and motor revolve 360 degrees under the arm, with automatic stops at each 90 degrees. Motor can be tilted vertically inside the yoke for any type bevel cut.



The saw is designed so that arm, when rotating, is always above the table. Pivot action moves saw toward work—gives full saw travel at any angle. Right or left miter cuts of from 0 to 90 degrees may be made. The saw has Quick-Set Stops at 30, 45, 60, and 90 degrees, and it takes only a few seconds to set this versatile saw at these commonly used bevel and miter positions.

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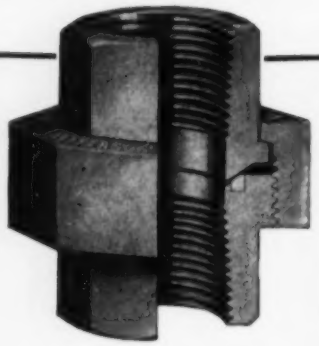

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These ratings have been achieved through Jefferson design and construction including such features as: air furnace malleable iron of 55,000 psi average tensile strength, seat rings of seamless drawn brass tubing, a ground joint that is truly spherical and the exclusive Jefferson Recessed Brass Seat.

Jefferson also manufactures: AAR male and female unions, Enduro 300#, Excel 250# and Master 150# unions. All types are also available with all-iron seats.

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49 Fletcher Ave., Lexington 73, Mass.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Bonding Agent

E-27 CHEMOTEC DIVISION OF EUTECTIC WELDING ALLOYS CORPORATION, Flushing, New York, N. Y., has recently placed on the market a new bonding material known as ChemoTec, which is the result of many years research.

In the higher heat ranges, from arc welding down to soft soldering, alloys had been developed that adequately met practically any situation that could arise in the field of metal bonding. However, below soldering temperatures there was nothing of a comparable nature available.

ChemoTec makes it possible to join practically any material, dissimilar metals, glass, ceramic, rubber, etc., from room temperature up to 500 F with a bond strength in excess of many solders.

This organic compound bonds by capillary and chemical action. Its high fluidity and extraordinary wetting characteristics give deep penetration of all but sealed joints. These properties enable high strength bonds to be made on any material, without heat and without pressure. This is the new method of bonding titanium, magnesium and aluminum. The bonding agent may also be used for joining ferrous and non-ferrous metals and related materials.

Lubricants

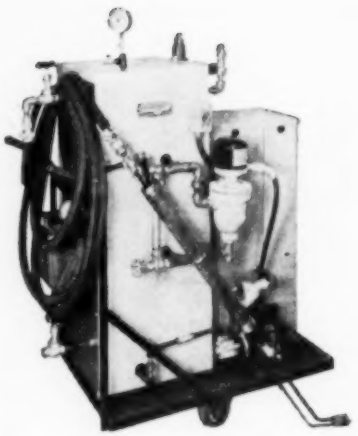
E-28 WARREN REFINING & CHEMICAL COMPANY, 750 Prospect Ave., Cleveland, Ohio, has developed "Plastilube," claimed to outperform grease in hundreds of industrial functions.

The lubricant displays excellent adhesiveness in boiling water and retains its pumpability at low temperatures. Although its main use is for lubrication of bearings where temperatures vary from below freezing to more than 500 F, it is adaptable for many industrial uses.

Steam-Jet Cleaner

E-29 LIVINGSTONE ENGINEERING COMPANY, Worcester, Mass., announces the new "Standard" Speedylectric Steam-Jet Cleaner, with automatic balanced control.

Featuring compact portability, fast action, operating simplicity, complete safety and all electric freedom from fire hazards, this new model is available for operation on 220, 440, or 550 volts a-c power. The operation of the



steam generator, regulation of detergent flow and atomization with steam at the jet are all under fingertip control of the operator at the steam gun or lance.

The Steam-Jet Cleaners are meeting exacting requirements in many fields including industrial plants, hospitals, bakeries, hotels, restaurants, food processing plants, printing establishments, textile mills, oil refineries, foundries, and pharmaceutical and chemical works.

Belting Tool

E-30 BRAMMER CORPORATION, 684 Broadway, New York 12, N. Y., has developed the newly patented prong-type tool called the "Brammertool" which makes it much simpler to attach and detach "V" link belting.

A light pressure inserts ends of prongs into standard slots of "V" links. Another easy twist opens up the slots so that rivet heads can be quickly slipped in or out to make or break connections in the belting. The new tool is said to save many valuable man-hours by making adjustments a matter of seconds.

Work Stand

E-31 METALLIC LADDER MFG. CORP., Randolph, N. Y., is marketing a new all-aluminum platform stand designed primarily for industrial use.

The rigidly-braced stand features wide "safety-tred" steps, large nonslip working platform, non-swivel ball bearing casters and corrugated rubber safety shoes. Easily assembled, it comes in 3 to 8 ft heights.

Chisel Grip

E-32 ROSE MANUFACTURING COMPANY, 1731 Arapahoe St., Denver, Colo., has introduced a new safety tool for industry,

known as the "Safe-Hi" Chisel Grip.

The chisel grips, which are available in both the 6 in. one-man model, and the 18 in., two-man model, are designed to speed up chiseling and sledging, permitting the worker to strike hard with safety.

Parts Cleaning Can

E-33 THE PROTECTOSEAL COMPANY, 1920 S. Western Ave., Chicago 8, Ill., announces that a new plunger-type parts cleaning can is now available which can be attached to a bench convenient to the machine operator and enables him to clean parts as they come from the machine, make micrometer checks for accuracy or any other type of inspection required without stopping the machine or interfering in any way with the continued process of the work.

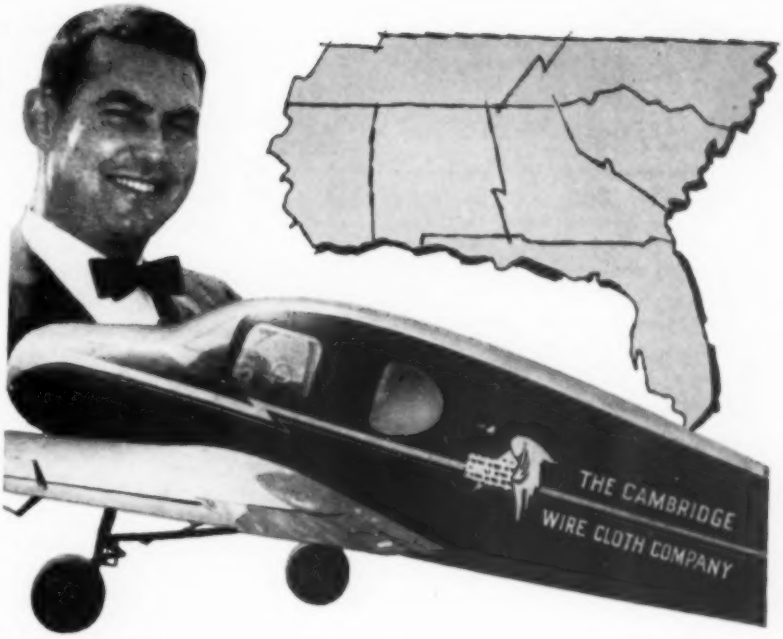
The unit is a terne plate, seam welded rectangular container measuring 10 in. x 7 in. x 8 in. deep to permit washing of long narrow parts, small parts, and square or rectangular piece parts. It has a capacity of 2 gallons of solvent or cleaning agent and is equipped with a metal-perforated plunger dasher which completely covers the opening.

Protective Coatings

E-34 PROTECTIVE COATINGS, INC., P. O. Box 2578, Tampa 1, Florida, are national distributors for two products which have found a wide field in plant maintenance: Cocoon and liquid Neoprene.

Cocoon is the plastic material used to preserve the mothball fleet of ships and airplanes for the United States Government after the last war. The material lends itself equally well to the waterproofing of masonry structures and to the vapor sealing of cold storage warehouses. It is an excellent substitute for paint on walls where the fumes from the operation will not allow normal paint to stay more than a few weeks.

The liquid Neoprene is the same Neoprene found in rubber tires, cable covers, and in numerous other manufactured items. The main difference is that the basic Neoprene is processed so that it can be applied like paint as a protective coating to a surface. The fumes do not penetrate the coating as they do in a porous painted surface causing oxidation underneath and lifting the coating. Descriptive literature describing both materials is offered.



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OFFICES IN PRINCIPAL INDUSTRIAL CITIES

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

One-Coat Enamel

E-35 PITTSBURGH PLATE GLASS COMPANY, 632 Duquesne Way, Pittsburgh, Pa., announces a new, one-coat, easy-to-apply satin finish enamel that requires no primer, that washes as easily as a baked enamel finish and that may be used on practically any surface, interior or exterior.

Developed as a companion line to Pittsburgh's Wallhide Rubberized Satin Finish the new product, called "Satinhide Enamel," is offered in 16 colors and white.

Hard-Facing Alloy

E-36 COAST METALS, INC., Little Ferry, N. J., has introduced a new hard-facing alloy featuring superior resistance to abrasion at high temperatures, the ability to withstand attack by molten copper and improved welding characteristics.

Because of its ability to resist abrasion at the temperature of hot-rolled steel, CM-119 alloy has already found successful application as hard facing for large rolls and as hot friction guides and soaking tong bits. And its resistance to attack by molten copper permits it to yield excellent results as protection for the lips of copper converters. CM-119 can be applied with any good arc welding process.

Suction Cleaner

E-37 THE KENT COMPANY, INC., 354 Canal St., Rome, N. Y., has introduced a suction cleaner with 27 gallon tank for wet and dry work, mounted on a platform truck for portability.

The suction and 27 gallon tank can be installed on the truck quickly, without the use of the tools, and it only takes a few seconds to release the clamps and empty the tank. When desired, the vacuum cleaner can be removed from the truck by unsnapping the clamps; thus providing a powerful, compact, portable vacuum cleaner. Suction unit can be used as a blower by merely inserting hose in exhaust of machine.

To change from dry to wet work, give dirt can on top of vacuum unit a quarter turn, remove and install wet tank. The large tank fills with

the liquid before any enters the tank on vacuum cleaner. The latter has an automatic shut-off valve, which operates when both tanks are full of liquid; thus liquid is prevented from passing through fans of motors.

Overload Indicator

E-38 WESTINGHOUSE ELECTRIC CORPORATION, Pittsburgh 30, Pa., announces a new load indicating device that provides a log of overload performance is now available on Westinghouse conventional distribution transformers.

Called the type PL (performance log) indicator, the device utilizes a bimetallic thermostat embedded in the transformer winding to give an accurate indication of copper temperature.

An excessive overload turns on a red signal light that is visible from the ground, and also registers the overload on a dial. When the coil temperature falls below the danger point, the red light goes out, but the dial pointer remains in position to indicate that an overload has occurred. This sequence is repeated for five overloads, after which the dial continues to count the overloads, but the red light stays on to indicate potentially dangerous conditions and the possibility of a burnout.

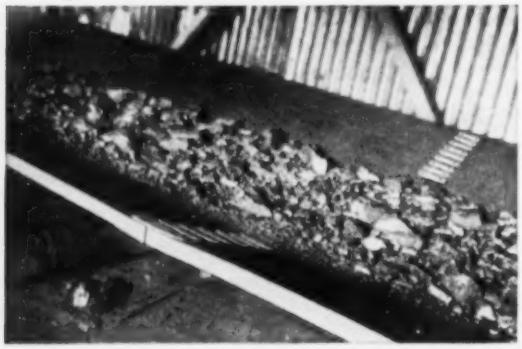
Bolt Heater

E-39 WESTINGHOUSE ELECTRIC CORP., Pittsburgh 30, Pa., is producing a new Corox bolt heater which makes possible greater bolt stressing in large hollow holding bolts.

The heater can be supplied in ratings ranging from 1000 to 6200 watts all at 120 volts. Various sizes of heater elements permit installation in bolts one to three feet long and hole diameters from one-half to one inch. With proper selection of power rating and size, the heater life will average approximately 500 hours.

FLEXCO®

BELT FASTENERS and RIP PLATES



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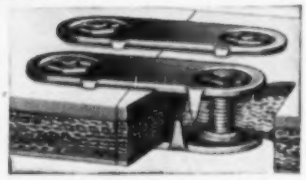
★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO., 4625 Lexington St., Chicago 44, Ill.

Electric Tool Tester

E-40 FENDALL COMPANY, 4633 N. Western Ave., Chicago 25, Ill., manufacturers of industrial safety equipment have introduced a new device known as the POW-R-SAFE Tool-Tester, which is said to quickly and accurately detect electrical defects in electric hand tools and extension cords.

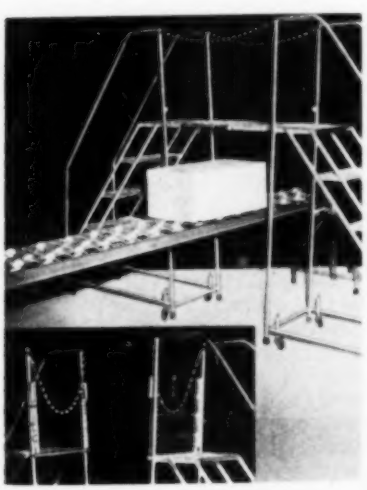
The safe working condition of such electric hand tools as drills, screwdrivers, nut-runners, saws, grinders, sanders, soldering irons, together with cords, can be instantly determined by simple finger-tip controls. Complete tests are performed in less than 10 seconds, and preliminary tests are conducted at a safe 6 volts to avoid electrical shock to the operator if the tool is faulty. Simple operation permits electrically untrained persons to conduct the tests efficiently.

Conveyor Walk-Over

E-41 BALLYMORE COMPANY, Wayne, Pa., has developed dual safety ladders equipped with connecting walkway to eliminate the passage blocks and inaccessible areas above conveyor systems.

The walkway can be folded up so that the ladders may be used for normal requirements when not needed to cross over conveyors.

Standard size ladders are available for practically any required height. Built of steel, the ladders are said to be rugged, long-lived. Two types are supplied. One has rubber tipped legs only for permanent or semi-permanent installation. The other is equipped also with casters for easy movement. These casters automatically retract when a person steps on the ladder so that the rubber tipped legs firmly engage the floor.



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Belmont sheet packings and gasket cutters are sold nationally through this experienced distributor organization. Use them and enjoy a new freedom from packing worry. Write on your company letterhead for catalog.

4-0-3

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Stainless Steel Solder

E-42 ALL-STATE WELDING ALLOYS CO., INC., White Plains, N. Y., has developed a new high capillary silver-bearing stainless steel solder, which is applicable with a soldering iron or torch at 430F.

It has long been recognized that on a wide variety of work, particularly on steel, stainless steel, copper, and nickel alloys, a stronger "soft" solder would greatly reduce the need for the costlier materials and methods of brazing. Extensive field tests have demonstrated that the new silver-bearing stainless steel solder has gone far in that direction. It is said to cost less than the silver brazing alloys, it is easier to apply, and has somewhat the same affinity for all metals. Thin layers are strongest. It also compares favorably with the other silver alloys in its adaptability to standard manufacturing, installation, and maintenance procedures.

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Chattanooga	Memphis	Oklahoma City
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New Orleans		Miami

Write for Name of Nearest Agent

Potentiometer Indicator

E-43 THE FOXBORO COMPANY, Foxboro, Mass., is offering a portable potentiometer indicator for use of iron and steel mills, power plants and gas utility companies, or other industrial plants, to prevent shutdowns.

The instrument spots impending thermocouple failures, tests the operation of other pyrometer instruments, and checks such equipment as heating units and test furnaces which may not warrant continuous measurement. The portable potentiometer is useful as a standby to replace any installed potentiometer temporarily out of service.

Pneumatic Drill

E-44 MALL TOOL COMPANY, 7725 S. Chicago Ave., Chicago 19, Ill., has introduced a new heavy-duty pneumatic drill for operations with maximum power on continuous runs.

The contoured pistol grip, trigger throttle and built-in speed regulator combine for easy, efficient handling. The drill has its own built-in oiler and all moving parts glide on precision ball bearings. It measures 6-13/32 in. in length, 2-1/16 in. in width, 6½ in. in height, and weighs only three pounds. The drill comes with a ¼ in. Jacobs chuck, key, wrench, hydraulic fitting, ¼ in. x 8 in. air hose, and lubricant.

Fluorescent Lamp Guard

E-45 THE GETS-A-LITE COMPANY, 3865 N. Milwaukee Ave., Chicago 41, Ill., has developed an inexpensive slip-on guard to prevent fluorescent lamps from falling from their sockets, despite heavy vibration or spreading of the fixtures.

According to the manufacturer, the device is an important contribution to fluorescent lamp safety, economy, and ease of maintenance.

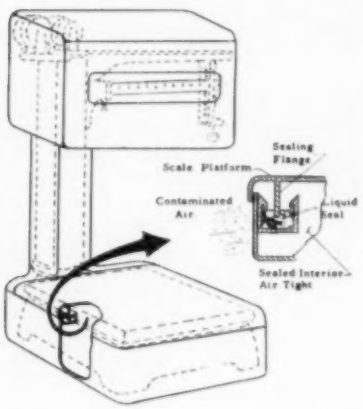
Pressure Lubricant

E-46 BEL-RAY COMPANY, INC., Green Village Road, Madison, N. J., has developed a new extreme pressure lubricant known as "Anti-Seize".

The product is a highly concentrated molybdenum disulfide compound which will not melt even at temperatures above 600 F. It is suitable for extreme pressure applications such as are encountered in machine tools, automatic production machines, and other industrial operations.

Industrial Scale Seal

E-47 APPLIED ENGINEERING COMPANY, Box 506, Orangeburg, S. C., is producing the Cunningham Scale Seal, a new device that fits over standard models of weighing scales, protecting them completely from foreign matter and corrosion under severe industrial conditions.



The feature of this device is a patented liquid seal. The sealing flange is fixed continuously around underside of the moving platform; thus an air-tight seal is effected. The flange is at all times protruding into the liquid channel irrespective of weight applied to the scales, and is always free from contact with anything except the liquid. The column and head of scales are also completely enclosed. An access door and windows provide a means for making weight settings and readings.

The entire device is designed as a "take down" model to permit inspection of scales as required by some State laws. A model of the Cunningham Scale Seal is available for practically any model of weighing scale, including various indicators.

Electrical Tape

E-48 UNITED STATES RUBBER COMPANY, Rockefeller Center, New York 20, N. Y., has added to its line of insulating tapes a new vinyl plastic electrical tape.

The tape is being marketed under the brand name of "Royalastic" and is a plastic film about 6 mils (0.006") thick. One side has a pressure sensitive adhesive that makes the over-all thickness about 7 mils.

The black tape has a tensile strength of 20 pounds per inch of width, excellent abrasion resistance, and good adhesion at low temperature. It has dielectric strength of approximately 10,000 volts.

Little stories of big savings in LAGONDA tube cleaning

The case of the Experimenting Refinery

• One of the big eastern refineries, experienced in cleaning their tube stills mechanically, the Lagonda way, figured they'd try the same method on their power boilers to see how costs compared with the approved chemical method formerly used. They found out a lot. Cleaned all tubes inside and out in two large B.&W. boilers, and even with the labor costs of mechanical cleaning, they saved actually *more than two thirds* over chemical cleaning charges! Did it faster, too, which is certainly an item.

Just shows it doesn't pay to take some things for granted—and it does pay to try out Lagonda tube cleaning. Why not do it soon?

Y2-2
GET BULLETIN Y-29
with details on all types of cutter heads and motors for cleaning all tubes, small, large, curved, straight. On request.

LAGONDA
...the oldest name in tube cleaning!

ELLIOTT COMPANY
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DISTRICT OFFICES IN PRINCIPAL CITIES

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

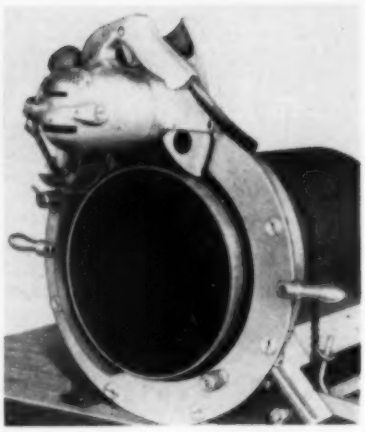
Power Cut-Off Saw

E-49 TRI-CLOVER MACHINE CO., Kenosha, Wisconsin, announce a new design of their "Super Speed" Power Cut-Off Saw, which is now available in two models for cutting ½" tubing through 12" pipe.

The saw, which uses abrasive cutting wheels, is designed for quick, accurate cutting of pipe and tubing of aluminum, copper, stainless steel, and other metals, in varying wall thicknesses. It cuts clearly, giving a square non-distorted surface without misalignment or burrs.

The saw uses 110 volt alternating current. It has a free-moving, rotating ring which encompasses the pipe or tubing being cut. It is attached to the frame so that saw and frame rotate together. All the operator needs to do is to set the saw to make the cut desired and then rotate the saw frame, cutting around the periphery of the tube or pipe.

The portability of the saw and its light weight make it ideal for shop



use as well as "in-plant" field fabricating. The unit is easily secured to any bench and quickly adjusted for any size tubing or pipe up to and including 12 inches.

Electric Drill

E-50 THOR POWER TOOL CO. (formerly Independent Pneumatic Tool Co.), Aurora, Ill., has announced a new ¼ in. Copper Line electric drill featuring pistol grip operation.

This low-priced addition to the company's power tool line is small,, light weight, and streamlined for fast, easy operation, yet powerful and sturdily built. It weighs 2¾ lb and measures 7⅝ in. in length.

Stack Exhaust Head

E-51 THE V. D. ANDERSON COMPANY, 1935 West 96th St., Cleveland 2, Ohio, announces that a new exhaust head has been developed for industrial stacks to clean up exhaust steam and vapors discharged to the atmosphere.

This exhaust head has no moving parts or filters and as a result, company reports it is virtually maintenance free with nothing to wear out, and nothing to clog up. The entrainment laden vapor entering the purifier is engaged by a stationary centrifugal element which imparts a carefully controlled but extremely rapid rotational motion to the vapor. This action guides all dirt particles, guck, oil and water outward to the walls of the purifier. Here it is drained to and ejected out the drain. The clean, dry steam continues upward and is discharged to the atmosphere.

Pipe Line Filter

E-52 DOLLINGER CORPORATION, 11 Centre Park, Rochester, N. Y., has announced four new small pipe line filter models, designed for installations requiring only 40 psi maximum pressures for compressed air or gas.

The new filters feature one-bolt accessibility for quick inspection and cleaning without removing filters from the line.

tubes
all sizes and gauges always on hand
ACCURATELY FABRICATED
BOILER TUBE CO. OF AMERICA
McKEES ROCKS, PA.
Pittsburgh District
PITTSBURGH • CHICAGO • FRED S. RENAULD & CO., LOS ANGELES

Portable Power Saw

E-53 MILWAUKEE ELECTRIC TOOL CORPORATION, 5316 W. State St., Milwaukee 8, Wis., is marketing a heavy duty, self contained, portable power saw known as the "Sawzall."

The tool answers the need for a special duty reciprocating type power saw that will stand the strain of continuous use by journeymen, installation engineers, maintenance men, and electricians.

Dehumidifier

E-54 REMINGTON CORPORATION, Air Conditioning Division, Auburn, N. Y., is produc a heavy duty electric dehumidifier called the "Moisture Magnet."

The complete, self-contained unit automatically removes excess water or moisture from the air of enclosed spaces in industrial plants, storage rooms, laboratories, warehouses or practically any installation within its range where increased air drying or protection from moisture damage is needed. It is designed to provide dependable humidity control at low cost.

Except for an electric outlet, no installation is necessary. No chemicals, duct-work or air outlets are required. For drainage, the unit may be placed over an existing floor drain or pails. Designed to operate at low cost, the unit comes with a 1 hp compressor or with a 1½ hp compressor.

Gasoline Powered Winch

E-55 STAMPO PRODUCTS, Minneapolis, Minn., has announced a lightweight portable electric or gasoline powered winch with a capstan-type drum for critical control of loads.

Called the Stampo Gypsiwinch, the unit is designed as a multi-purpose hoist for fast, low cost handling of materials in industrial plants. Standard models are equipped with either electric or gasoline power units ranging in size from ¾ hp to 7½ hp. Two gripper type handles facilitate moving the hoist about on the job while the fabricated all-steel base may be secured by ½ in. lag bolts to provide a stable platform for pulling or lifting.

Steam Hose

E-56 QUAKER RUBBER CORPORATION, Division of H. K. Porter Company, Inc., Philadelphia 24, Pa., has developed a new steam hose, combining wire braided and glass cord construction.

Inner braids of wire give this new Ironsides brand steam hose high burst resistance. The glass cord outer braid provides additional strength, as well as a high degree of insulation. The tube and cover are both made of heavy gauge Ebonite heat resistant compound. Ironsides steam hose is flexible, kinkproof, and is for working pressures up to 200 lb. It has an inside diameter range from ½ in. to 1¼ in.

Welding Electrode

E-57 GENERAL ELECTRIC COMPANY, Welding Department, Schenectady 5, N. Y., has announced a new general-purpose mild-steel welding electrode, designed for optimum flexibility of application with reduced operator effort.

Designated as G-E Type W-610-A, the new electrode is a d-c reverse-polarity rod meeting AWS Class E-6010 specifications.

According to G-E engineers, the electrode facilitates butt, fillet, lap joint, and edge welding in all positions. Its ability to take high currents, together with freedom from reaction pitting, fingernailing, spatter, and blistering of the coating, assures a high ratio of inches-of-welding to inches-of-electrode used.

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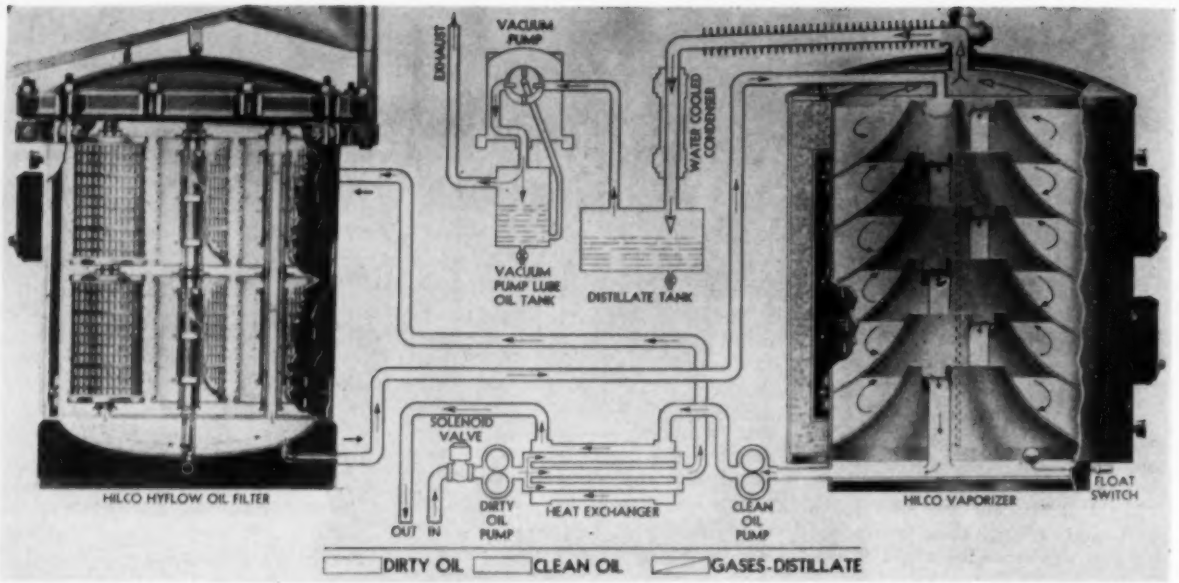


Schematic diagram shows only principle of operation. Dirty oil picked up by the dirty oil pump. Solenoid valve, controlled by float switch in the vaporizer, prevents flooding of vaporizer in event of failure of any of the parts. Oil passes through high capacity regenerative heat exchanger, which picks up heat from the hot outgoing oil. From here it passes to oil filter where all traces of solid matter that might be contained in the oil are removed, including acids.

After filtering, oil passes over to vaporizer where it is heated under vacuum, which is created by vacuum pump. Volatile materials are completely removed. Vaporizer temperature is thermostatically controlled and adjustable.

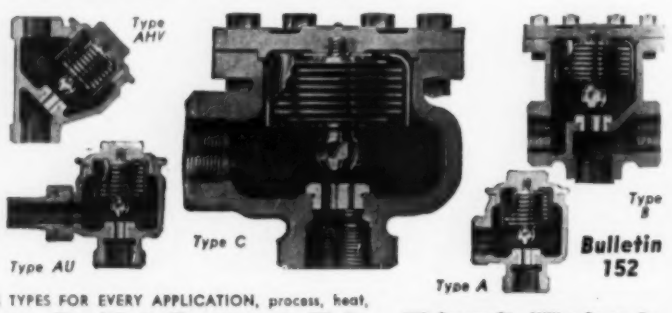
Condensed vapors pass into distillate tank where they are withdrawn occasionally. Clean oil is continuously withdrawn from vaporizer by means of the clean oil pump and through the heat exchanger where heat is transferred to cooler incoming oil. Clean oil passes out to oil receiving tanks or to the equipment reclaimer is serving.

In This Plant Nicholson Traps

SAVED 10% IN STEAM COSTS

Chief Engineer H.F.D. stated, after Nicholsons replaced mechanical traps in his plant: "Saving in steam waste cut our fuel cost at least 10%. Yet application temperatures were up 30°-40°. And relief of all air binding effected faster warm-up."

Operate on lowest temperature differential; 2 to 6 times average drainage capacity; maximum air venting. For other advanced Nicholson features send for Bulletin 152.



Bulletin 152

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TRAPS · VALVES · FLOATS

Oil Reclaiming Units

E-58 THE HILLIARD CORPORATION, 102 W. Fourth St., Elmira, N. Y., has added to its line of oil reclaimers, new higher capacity units which are for use in the purification and maintenance of transformer insulating oils, vacuum pump lubricating and sealing oils, lubricating oils being used in diesel and gasoline engines, and many other types of industrial oils.

The primary function of the Hilco Hyflow Oil Reclaimer is to maintain lubricating or industrial oils in clean condition by continuous removal of contaminants which impair operation efficiency. Contaminants such as atmospheric dust, moisture, fuel dilution, sand, scale, rust, metal chips, carbon, soot and acids may accumulate in the oil during the period of use. The oil itself may break down or oxidize to form acid, varnish, carbonaceous sludge, etc. These various contaminants cause corrosion, excessive wear, reduced efficiency, and may impair proper operation of the device or equipment in which it is used. The new reclaimer is said to provide a safe and economical method of constantly maintaining the new oil characteristics of lubricating and industrial oils.

The reclaimer contains all the necessary components to properly reclaim or purify by removing all types of

contamination from the kind of oil they are intended to handle.

Units are available in capacities up to 500 gal/hr, filters only for combination with vaporizers, or the vaporizers separately. Most units are made up to customer requirements, requiring floor space from 10 to 100 sq ft.

Free additional information is available to readers of SP&I. Circle the item code number on one of the reader service post cards provided on pages 17-18.

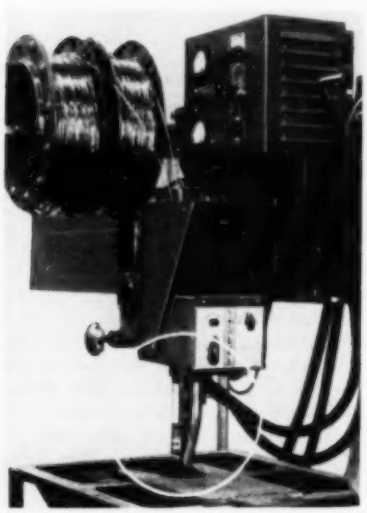
Automatic Welding Technique

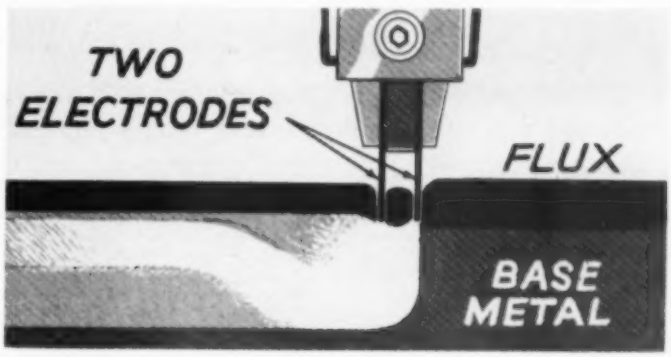
E-59 THE LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, has developed "Twinarc" welding, which employs two small electrodes in place of a single larger electrode.

The two electrodes are fed simultaneously through a single head and a single jaw. Both electrodes deposit metal in the weld crater.

A special electrode jaw, wire feed rolls and wire guides adapt any standard Lincoln weld head for using two electrodes. The standard single head controls are used as well as the standard d-c welding current generators. Two generators may be paralleled or a single 1500 ampere unit may be used. The two-wire head will feed electrodes in 5/64 in., 3/32 in. and ⅛ in. diameter sizes. The two electrodes are fed down into the jaw where the welding current is conducted into each electrode from the same contact block. The electrodes are pressed against each side of this contact block which determines the electrode spacing. This spacing is normally ½ in. but can be adjusted where necessary. Both electrodes are regulated equally by the common arc voltage control. The welding current from the common welding generator automatically divides between them.

The electrodes are normally in line along the seam but may be skewed ⅛ in. so that they are across the seam. This produces a wider bead. If a still wider bead is desired or if burn-through is a problem, the electrodes can be run side by side. Side by side operation is recommended for poor fit-up.





The Twinarc welding technique developed by The Lincoln Electric Company is recommended for use on butt or fillet welds in ¼ in. or thicker plate — an application normal for automatic hidden or submerged arc welding. Two small electrodes are used in place of a single larger electrode. Higher currents possible with two electrodes increase rate of metal deposition, amount of penetration and, consequently, welding speeds.

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WHAT'S NEW in Plant Maintenance

Free literature on what's new in maintenance equipment and supplies is offered by leading manufacturers. For your free copy, circle the item number on one of the service post cards provided on pages 17 and 18.

Q-1 **INDUSTRIAL TRUCK MAINTENANCE**—Bulletin 2100, 14 pages—Series of photographs and text illustrating vital checking points for periodic care and maintenance of industrial trucks to protect investment and assure continuity of service. —BAKER INDUSTRIAL TRUCK DIVISION of The Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.

Q-2 **PAPER MILL CLEANING**—Guide, 30 pages—Describes latest procedures designed to simplify maintenance cleaning of equipment in pulp and paper mills, including descaling pulp mill heaters and related equipment; cleaning pulp washers and screens, and filter beds; removing soils from centrifugal pulp cleaners, removing slime, etc. Illustrated.—OAKITE PRODUCTS, INC., 123A Rector St., New York 6, N. Y.

Q-3 **VIBRATION PADS**—Booklet, "Why It Pays to Anchor Your Machines on Unisorb"—Describes felt pads applied with cement furnished by the manufacturer, to eliminate use of bolts and lag screws in machine mounting, and to reduce vibration and noise.—THE FELTERS CO., 237 South St., Boston, Mass.

Q-4 **BOLTING FOR PRESSURE**—Bulletin 524, 24 pages—Reprint of ASME paper on Modern Steel Bolting for Piping and Pressure Vessels. Comments on ASTM specifications; gives tables on compilation of properties and bolting selection; discusses behavior of bolted flanged connections of the types used in piping and pressure vessels.—TAYLOR FORGE & PIPE WORKS, Box 485, Chicago 90, Ill.

Q-5 **SEALING COMPOUND**—Bulletins, "Prevent Connection Leaks" and "Leaking Connections," 4 pages each—Enumerate industrial applications for Rectorseal as a thread or gasket sealing compound. Service Charts and price lists are included.—RECTOR WELL EQUIPMENT, INC., Rectorseal Division, 2215 Commerce St., Houston 2, Texas.

Q-6 **MAINTENANCE HINTS**—G-E Fuse Catalog—Covers renewable time-delay fuses, one-time fuses, plug fuses, fuse holders, and copper link fuses. Technical data section includes operation of fuse, maintenance hints, dimensions of fuses and fuse holders—GENERAL ELECTRIC COMPANY, Construction Materials Division, Bridgeport 2, Conn.

Q-7 **INDUSTRIAL ROOFING**—Manual #2, 82 pages—Complete data and specifications for Careystone corrugated asbestos-cement roofing and siding, including application recommendations, shipping and crating information, description of estimating service. Illustrated with drawings and photographs.—THE PHILIP CAREY MFG. CO., Cincinnati 15, Ohio.

Q-8 **ROOFING SPECIFICATIONS**—Manual, 8 pages—Compilation of roofing data for architects, engineers, contractors, and applicators. Includes all information necessary for specification and erection of bonded built-up roofs—THE PHILIP CAREY MFG. CO., Dept. FBUM, Cincinnati 15, Ohio.

Q-9 **PLASTIC PIPE**—Booklet, "Carlon 'L' Rigid Plastic Pipe," 4 pages—Information on plastic pipe stresses long life as result of heavy-wall protection against burst or collapse, high tensile and flexural strengths, and chemical resistance, as well as guarantee against rot, rust and electrolytic corrosion. Illustrated.—CARLON PRODUCTS CORPORATION, 10225 Meech Ave., Cleveland 5, Ohio.

Q-10 **AMMONIA VALVES**—Catalog No. 801, 16 pages—Covers series of newly designed valves developed for use in industrial applications where ammonia and other gases, non-corrosive to steel, are used. Illustrated with equipment photographs and line drawings.—HENRY VALVE COMPANY, 3215 North Ave., Melrose Park, Ill.

Q-11 **CONDENSATION CONTROL CHARTS**—Folder, 4 pages—Charts show the exact degree of protection from condensation which the manufacturer claims is afforded by spray applied cork and Gil-

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Scale Model—Rome, Georgia, Transformer Plant

"Don't fence me in!" Such a feeling for space was in the minds of General Electric planners in laying out the new 25-million-dollar power transformer plant at Rome, Ga. Uniquely, the planners set up in scale model form the complete manufacturing, testing, and shipping processes before fixing any building dimensions.

Above William S. Ginn (left), general manager of the Company's Power Transformer Department, and David B. Lawton, who will be manager of the new Rome plant, study the interior layout model of the coil-winding building for the new facilities.

Construction of the Rome plant has been started and is expected to be completed this summer. In the new plant, power transformers will be entirely assembled for the first time by production line methods.

sonite mastic insulation. Both temperature data and efficiency ranges of Insul-Mastic Type D are given.—INSUL-MASTIC CORPORATION OF AMERICA, 1141 Oliver Bldg., Pittsburgh 22, Pa.

Q-12 **WELDING ACCESSORIES** — Booklet B-5451, 12 pages—Line of arc-welding accessories, varying from electrode holders and ground clamps to protective clothing and headgear, is described and illustrated, with specification data supplied in every case. Discusses application.—WESTINGHOUSE ELECTRIC CORPORATION, Box 2099, Pittsburgh 30, Pa.

Q-13 **DEMINERALIZATION** — Bulletin 3803, 28 pages—Explains the chief applications, principles of operation, design features, advantages and recommendations and specifications of demineralizing and silica removal apparatus and synthetic resins, in silica removal by ion exchange.—THE PERMUTIT COMPANY, 330 West 42nd St, New York, N. Y.

Q-14 **WATER CONDITIONING HANDBOOK**—Data Book No. 2478A, 102 pages—Pocket size book compiled for convenience of practicing engineers and those who work with water conditioning problems. Covers hydraulics, impurities in water, chemicals used in water treatment, specific gravities, and chemical reactions. Includes 77 tables of information.—THE PERMUTIT COMPANY, 330 West 42nd St., New York, N. Y.

Q-15 **LEATHER BELTING**—Catalog and Application Manual No. 101, 38 pages—Gives detailed information for the selection and application of power transmission belting. Discusses material, production power, and various types available. Illustrated with plant photographs and line drawings.—GRATON & KNIGHT COMPANY, 356 Franklin St., Worcester 4, Mass.

Q-16 **ELECTRICAL MAINTENANCE** — Catalog No. 29, 64 pages—Describes equipment for better maintenance safety and production. Chapters include production equipment; commutator maintenance; motor maintenance; electrical maintenance; safety equipment; and mechanical maintenance.—MARTINDALE ELECTRIC CO., Box 617, Edgewater Branch, Cleveland 7, Ohio.

Q-17 **ARC WELDING** — Catalog EW173, 40 pages—Plant photographs show how arc welding is used profitably for maintenance, repair, and production in various industries including construction, heating, machinery, petroleum, and many others. Also pictures line of arc welders, electrodes, and accessories.—HOBART BROTHERS COMPANY, Troy, Ohio.

Q-18 **TUBING STEEL** — Bulletin TDC-146, 4 pages—Discusses B&W Croloy 5, one of the alloy tubing steels widely used in elevated temperature service for such applications as furnace tubes, piping and superheater tubing, etc.—THE BABCOCK & WILCOX COMPANY, Tubular Products Division, Beaver Falls, Pa.

Q-19 **METAL FRAMING**—Pocket Catalog, 84 pages—Designed for use by the worker on the job; contains ideas, photographs, drawings and data on how to frame, hang, mount and support all kinds of mechanical and electrical equipment with adjustable Unistrut all-purpose metal framing.—UNISTRUT PRODUCTS COMPANY, 1013 W. Washington Blvd., Chicago 7, Ill.

Q-20 **PLASTIC ELECTRICAL TAPE** — Weatherly Index 730, Sheets 9A-4; 1, 2 pages each—Dutch Brand friction tape, plastic electrical tape, and wire connectors are illustrated and described, with sizes available and price lists. Physical properties, chemical properties, and electrical properties are outlined.—VAN CLEEF BROS., INC., Division of Johns-Manville, 7800 Woodlawn Ave., Chicago 19, Ill.

Q-21 **LOCKNUTS AND COLLARS**—Bulletins, 4 pages each—One covers Flexloc self-locking nuts and the other describes Hallowell steel shaft collars. Both give information in text and illustrations on product properties and applications.—STANDARD PRESSED STEEL CO., Box 864, Jenkintown, Pa.

Q-22 **V-BELTS**—Bulletin 20B7786—High capacity Texrope V-belts which carry 40 per cent greater horsepower rating, are oil resistant and static conducting are described, with manufacturer's recommendation for applications.—ALLIS-CHALMERS MANUFACTURING COMPANY, Box 512, Milwaukee 1, Wis.

Powers Manufacturing Company—Longview, Texas Producing Power Transmission Chains and Sprockets

The above recent aerial view shows the new manufacturing plant of the *Powers Manufacturing Company* at Longview, Texas. The company entered the manufacturing field as a completely new organization with a plant designed and built for the production of a comprehensive line of power transmission chains and sprockets.

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Q-23 **WIRING DIAGRAMS**—Bulletin 709, 24 pages—Describes many ways the Allen-Bradley magnetic across-the-line starter can be applied. Illustrates both wiring diagram symbols and line diagram symbols, and wiring diagrams for various across-the-line starter applications.—ALLEN-BRADLEY COMPANY, 118 W. Greenfield Ave., Milwaukee 4, Wis.

Q-24 **TRUCK MAINTENANCE** — Field Booklet, 13 pages—Consists of a preventive maintenance and inspection schedule for Automatic trucks.—AUTOMATIC TRANSPORTATION COMPANY, 101 W. 87th St., Chicago 20, Ill.

Q-25 **DEHUMIDIFYING EQUIPMENT**—Folder, 6 pages—Enables the plant superintendent or other executive to determine the minimum dehumidifying equipment and capacity needed to eliminate moisture problems. Illustrated.—REMINGTON CORPORATION, Air Conditioning Division, Auburn, N. Y.

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Q-26 **WELDING ACCESSORIES** — Catalog, 16 pages—Illustrates and describes the company's line of welding accessories, an innovation of the past half year, offered by the "package buying" method.—A. O. SMITH CORP., 3533 North 27th St., Milwaukee, Wis.

Q-27 **DRIVING TOOLS**—Catalog—Drive-It powder actuated tools and Super Slugger electric hammers are illustrated and described. Powder actuated fastening tool is a quick method of inserting steel studs into steel and concrete with the use of small powder charge, and electric hammer takes direct drive and changes it to reciprocating drive.—TEMPCO PRODUCTS CO., 1900 Euclid Ave., Cleveland 15, Ohio.

Q-28 **FILTER PLANT GAUGES**—Bulletin No. 1000—Describes filter plant gauges, with illustrations and dimensional data on the many forms of gauges used in filter plants such as rate of flow, loss of head, elevation, wash water and sand expansion units.—SIMPLEX VALVE & METER CO., 68th & Upland Sts., Philadelphia 42, Pa.

Q-29 **RUBBER-LINED PIPE JOINT**—Catalog, 10 Pages—Illustrates and describes a new system for joining and replacing rubber-lined pipe in the field. Contains equipment photographs, line drawings, and diagrams.—GATES ENGINEERING COMPANY, P. O. Box 1711, Wilmington, Delaware.

Q-30 **STRUCTURAL PLASTIC**—Bulletin 9-1, 6 pages—Gives information on fabrication and design factors, physical strength and chemical resistance of unplas-

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ticized, rigid polyvinyl chloride Ampcoflex for application in industrial corrosion problems. Illustrated. — ATLAS MINERAL PRODUCTS COMPANY, 101 Ash St., Mertztown, Pa.

Q-31 WIRE CONVEYOR BELT—Woven Wire Conveyor Belt Catalog, 134 pages—Elaborately illustrated with plant photographs showing recommendations for handling in various types of industries. Typical layouts, installational and operational data are included. — THE CAMBRIDGE WIRE CLOTH COMPANY, Cambridge, Md.

Q-32 A-C VOLTAMMETER — Bulletin 6AA, 1 page—Gives specifications and performance data on Model 601 a-c Voltammeter, featuring dual, multi-range meters for simultaneous potential and current measurements from 0.2 to 500 amp at from 30 to 600 volts.—ASSOCIATED RESEARCH, INCORPORATED, 3758 W. Belmont Ave., Chicago 18, Ill.

Q-33 ELECTRICAL TAPE—Booklet, 12 pages — Illustrates and describes "Scotch" brand electrical tapes and related electrical products for construction and maintenance of industrial wiring.—MINNESOTA MINING AND MANUFACTURING CO., 900 Fauquier Street, St. Paul 6, Minn.

Q-34 V-BELTS—Catalog (Form 3787), 8 pages—Features new simplified conversion tables whereby user can determine quickly and easily the correct belt for replacements. Prices, dimensions, weights and construction details are presented.—THERMOID COMPANY, 200 Whitehead Road, Trenton, N. J.

Q-35 SLING CHAIN CHART—Notebook or Wall Type Chart—Identifies the various types of sling chains and the different attachments which may be used on single, double, triple and multiple slings for lifting any given load.—THE McKAY COMPANY, 342 McKay Bldg., 1005 Liberty Ave., Pittsburgh 22, Pa.

Q-36 WEED CONTROL—Folder, 4 pages —Presents four types of weed and brush control products and their applications.—BRULIN & CO., INC., Dept. 00635, 2939 Columbia Ave., Indianapolis 7, Ind.

Q-37 INSULATION SPECIFICATIONS—Catalog IN-128A, 52 pages—Describes complete insulation service for oil refineries and chemical process plants. Illustrated with plant applicational photographs.—JOHNS-MANVILLE, 22 East 40th St., New York 16, N. Y.

Q-38 GASKETS — Catalog PK-35A, 50 pages—Illustrates and describes use of Goetze metal gasket as a medium for confining liquids and gases where high temperatures and pressures, and extreme corrosive conditions are present in industrial processes. — JOHNS-MANVILLE, 22 East 40th St., New York 16, N. Y.

Q-39 BUILT-UP RE-ROOFING — Catalog B.U.-49A, 28 pages—Discusses maintenance of industrial roofs, and serves as a guide to good practice in built-up re-roofing.—JOHNS-MANVILLE, 22 East 40th St., New York 16, N. Y.

Q-40 POWER TRANSMISSION MACHINERY—General Catalog D-49 Jr., 256 pages—Includes data on bearings, take-ups and hangers; V-belt drives; steel pulleys; speed reducers; friction clutches, couplings and collars; vises; and other engineering data.—DODGE MANUFACTURING CORPORATION, Mishawaka, Ind.

Q-41 INDUSTRIAL V-BELTS — Catalog No. 43-A, 118 pages—Lists specific applications of the company's standard, general purpose line of FHP belts for servicing the great bulk of everyday requirements. Includes design data and illustrations. — QUAKER RUBBER CORPORATION, Division of H. K. Porter Company, Inc., Tacony and Comly Sts., Philadelphia 24, Pa.

Q-42 ULTRASONIC INSPECTION — Reports No. 50-7001, 7002, 7003, and 7004; 2 pages each—These sheets illustrate the testing problems most prevalent in specific industries and graphically portray the ultrasonic solution. A separate sheet is devoted to each problem.—SPERRY PRODUCTS, INC., Danbury, Conn.

Q-43 V-BELT SHEAVES—"QD" Sheave Specification Guide #83 — Gives dimensions and weights of QD V-Belt sheaves and hubs. Construction features are described by cutaway photographs and instructions are illustrated by pictorial panels. Tables and line drawings give complete hub and sheave dimensions.—FORT WORTH STEEL & MACHINERY CO. P. O. Box 1038, Fort Worth, Texas.

Q-44 TEMPERATURE CONTROL—Manual, 24 pages—"The Design and Process Engineers Guide to Industrial Temperature Measurement and Control" presents the basic principles of industrial temperature control in practical fashion.—THE PARTLOW CORPORATION, New Hartford, N. Y.

Q-45 PORTABLE ELECTRICAL TOOLS —Catalog No. 39, 40 pages—Illustrates and describes Thor Universal Electric Tools, including air tool kit; drills; grinders; impact wrenches; polishers; tappers; and accessories for each item.—THOR POWER TOOL COMPANY, Aurora, Ill.

Q-46 HYDRAULIC POWER TOOLS—Bulletin A-5, 12 pages—Gives information on benders, jacks, pumps, and shears, with equipment photographs and line drawings. Includes supplement illustrating and describng the double-acting air engine pump for horizontal and vertical operation. — THE WATSON-STILLMAN COMPANY, Division of H. K. Porter Company, Inc., Roselle, N. J.

Q-47 REDUCE DUST—Booklet 500-320, 12 pages—Tells how to reduce stack dust from small stationary plants, with particular attention to those up to approximately 300 boiler horsepower. Factors influencing the quantity of solids in stack gases are reviewed.—BITUMINOUS COAL RESEARCH, INC., 2609 First National Bank Bldg., Pittsburgh 22, Pa.

Q-48 BELT FASTENERS—Four Catalogs—Illustrate and describe fasteners for all types of leather, fabric, woven, rubber, transmission and conveyor belts; fasteners are made from malleable iron with wedge shaped teeth that wedge firmly into the belt without cutting or weakening it, and do not require special tools as only a hammer is needed for application.—W. O. & M. W. TALCOTT, INC., P. O. Box 1207, Providence, R. I.

Q-49 INDUSTRIAL SAWS — Catalog M-52, 12 pages—Illustrates and describes Delta radial arm saws and accessories. Photographs show equipment, oper-

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ation, and applications.—DELTA POWER TOOL DIVISION, Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh 8, Pa.

Q-50 **LATHES**—Catalog 5205, 90 pages—Lathes, drill presses, bench shapers, and accessories are illustrated and described, with data on installation and operation.—SOUTH BEND LATHE WORKS, 425 East Madison St., South Bend 22, Ind.

Q-51 **UNIONS**—Catalog B-51—Illustrates and describes complete line of both malleable iron and steel pipe unions, giving construction features, types, sizes, and prices. —DART UNION COMPANY, Thurbers Ave. Eddy & Blundell Sts., Providence 5, R. I.

Q-52 **PLASTIC PIPE**—Leaflets, 2 pages each—"Here are the Answers on Flexible Carlon Plastic Pipe" and "Here are the Answers on Rigid Carlon Pipe" present answers to most frequently asked questions on flexible and rigid plastic pipe.—CARLON PRODUCTS CORPORATION, 10225 Meech Ave., Cleveland 5, Ohio.

Q-53 **JET CLEANER**—Bulletin No. 70, 6 pages—Describes new "Standard" model Steam-Jet Cleaner with high pressure dry steam for all indoor cleaning, jobs and the Hydrajet Cleaner which combines high-pressure, high-temperature water and detergent for wash deck cleaning of heavy equipment. — LIVINGSTONE ENGINEERING COMPANY, 100 Grove St., Worcester, Mass.

Q-54 **FLEXIBLE CORDS** — Catalog, 24 pages—Includes new Underwriters' classifications for flexible cords manufactured by the company, gives information on cord selection, and data on Dynaprene and rubber jacketed cords as well as braid covered types.—WHITNEY BLAKE COMPANY, New Haven 14, Conn.

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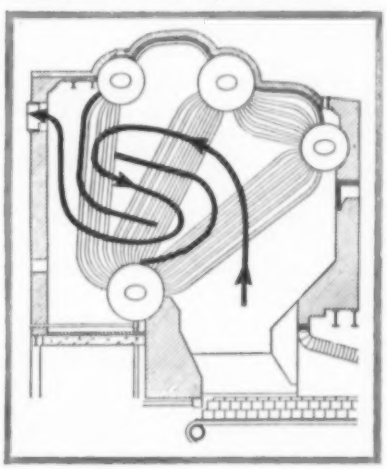

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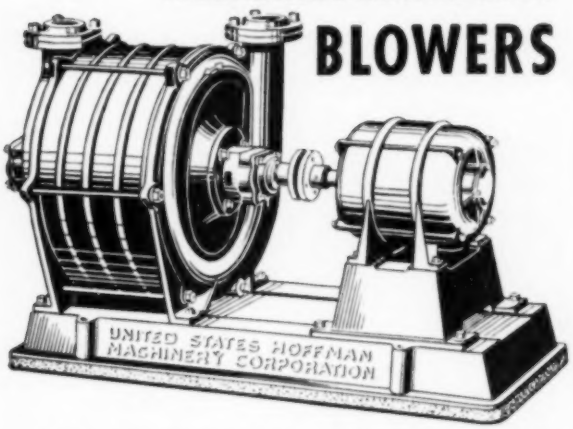

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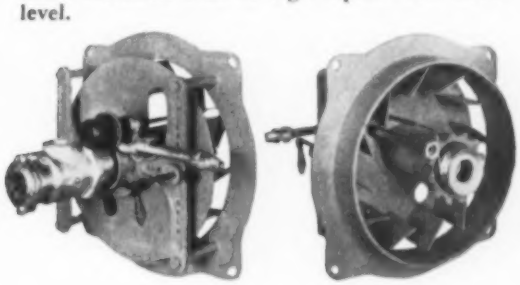

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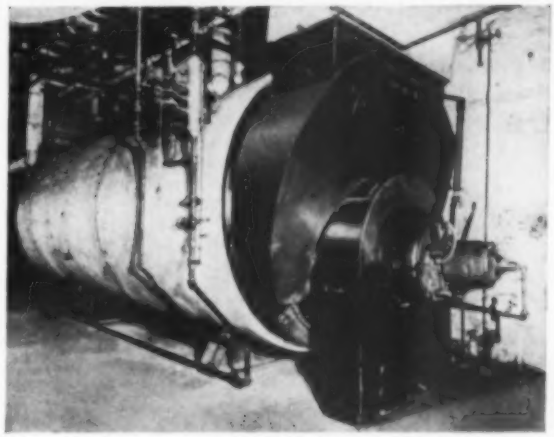

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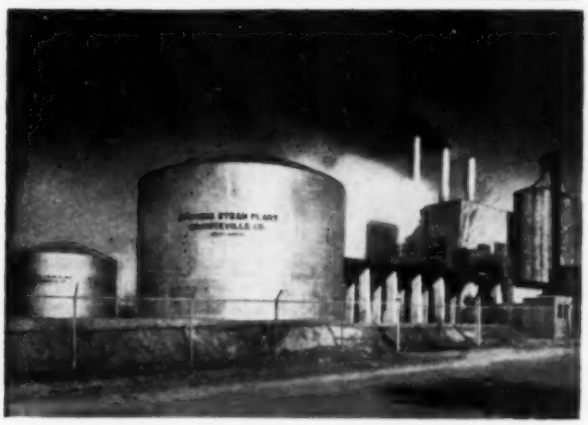

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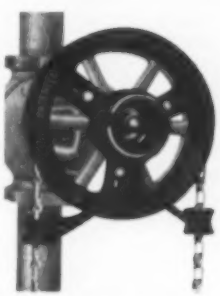

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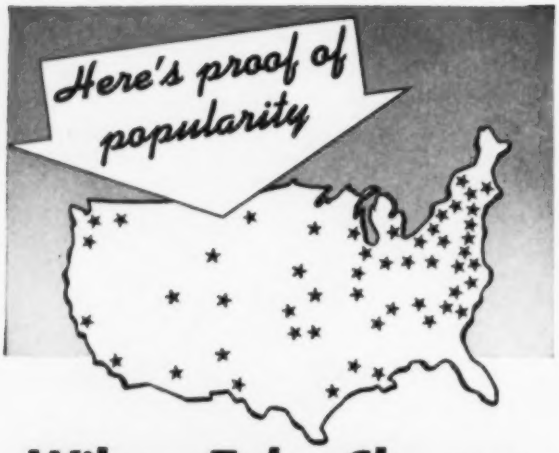

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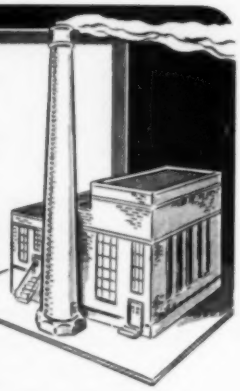

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FUNDAMENTALS OF BOILER PLANT ENGINEERING

(Basic Principles of Steam Plant Practice)
By A. D. HOLLAND
Assoc. Prof. of Mech. Engr., Georgia School of Technology

"Fundamentals of Boiler Plant Engineering"—is different from most handbooks in that it goes into the fundamental principles of boiler plant operation. It is written so that it can be studied by those who have not had an opportunity to learn these basic laws; at the same time its many charts, tables and formulae make it a valuable reference book for the trained engineer.

The basic principles covered in this book have such wide application that it will be extremely helpful to refrigeration, air conditioning, textile and hydraulic engineers and master mechanics. Stiff cover, cloth binding, 4½ x 7 inches, 232 pages, 37 tables, 55 illustrations, 30 memorandum pages for your special notations. "FUNDAMENTALS OF BOILER PLANT ENGINEERING" may be secured with a 3-year subscription to SOUTHERN POWER & INDUSTRY for $3.00.

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JENKINS PRACTICAL PIPING LAYOUTS

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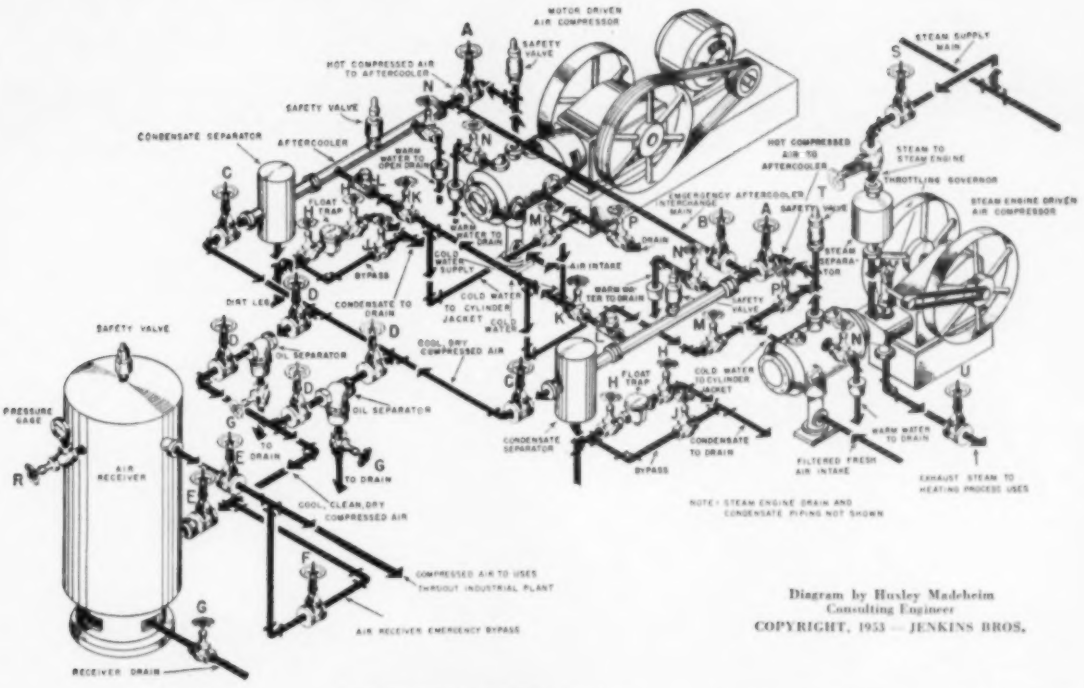

Diagram by Huxley Madeheim
Consulting Engineer

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VALVE RECOMMENDATIONS
Send for details of Jenkins Valves to suit varying conditions.

Code	Quan.	Jenkins Valves	Service
A	2	Fig. 651-A I.B.B.M. Gate	Compression Discharge Shutoff
B	1	Fig. 651-A I.B.B.M. Gate	Emergency Changeover Line
C	2	Fig. 651-A I.B.B.M. Gate	After Cooler Shutoff
D	4	Fig. 651-A I.B.B.M. Gate	Oil Separator Shutoff
E	2	Fig. 651-A I.B.B.M. Gate	Air Receiver Shutoff
F	1	Fig. 651-A I.B.B.M. Gate	Air Receiver Shutoff
G	3	Fig. 106-A Bronze Globe	Drain Line
H	4	Fig. 950 Bronze Globe	Trap Shutoff
J	2	Fig. 950 Bronze Globe	Trap By Pass
K	2	Fig. 106-A Bronze Globe	Cold Water Control
L	2	Fig. 352 Swing Check	Prevent Backflow
M	2	Fig. 106-A Bronze Globe	Cold Water Control
N	4	Fig. 106-A Bronze Globe	Drain Shutoff
P	2	Fig. 106-A Bronze Globe	Drain Shutoff
R	1	Fig. 744-G Needle Angle	Pressure Gage Control
S	1	Fig. 204 I.B.B.M. Gate	Steam Supply Line
T	1	Fig. 923 I.B.B.M. Globe	Steam Engine Shutoff
U	1	Fig. 651-A I.B.B.M. Gate	Engine Exhaust Shutoff

How to plan PIPING CONNECTIONS FOR AN INDUSTRIAL PLANT AIR COMPRESSOR

Compressed air is more economically supplied from a central installation in plants where demand is extensive. In such a system, the highest single pressure requirement in the plant determines the number of compression stages needed, and local pressure reducing stations meet the requirements of specific operations.

A single stage system is shown in this layout. Equipped with electric and steam driven compressors, this installation can develop 125 p.s.i. The former usually serves as a stand-by unit, but both can be used jointly for heavy load conditions.

The compressed air, after leaving the compressors, passes through a water-cooled after-cooler, which lowers air temperature and condenses moisture. The air then goes through oil separators and on into the air receiver, which decreases pressure pulsations and serves as a storage reservoir.

A capacity reduction device helps control load fluctuations in the constant-speed electrically driven compressor. In variable speed steam driven compressors, the throttling governor responds to load changes.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

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Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 65.

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Dowell engineers apply liquid solvents according to the technique demanded by the job: for example, by filling, spraying, jetting, cascading or vaporizing.

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